# American Aviation

**JANUARY 2, 1956** 

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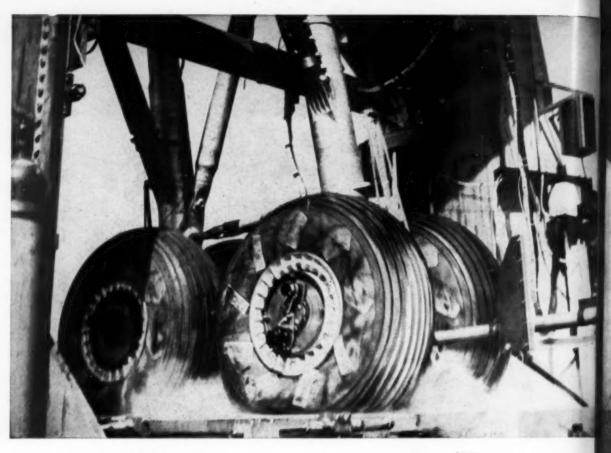
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these punishing tests is the new Lockheed Super G Constellation, already placed in service by TWA. The Super G Connie's landing gear is only one of the many structural sections of the new plane fastened with vibration-proof Elastic Stop nuts.

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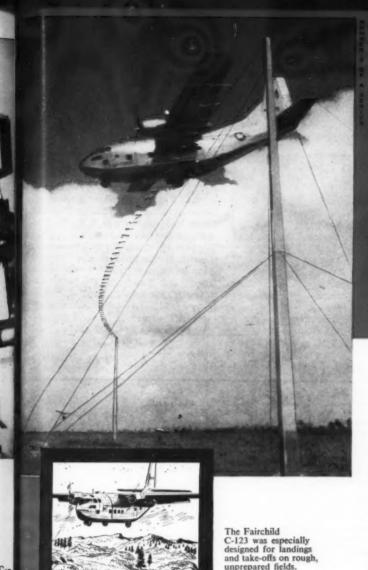
- vibration-proof locking
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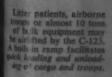
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A Division of Fairchild Engine and Airplane Corporation.







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AMERICAN AVIATION

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Comparatively young, North American's Columbus Division has already gained success that has established the organization's future: The highly-regarded FJ-4 Navy FURY JET\* is a Columbus product... from concept, through development to line production. Naturally, personal opportunity is excellent in a younger organization; with opportunity goes stability because of the association with North American Aviation, the company that has built more airplanes than any other in the world.

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ENGINEERING AHEAD FOR A BETTER TOMORROW

NORTH AMERICAN AVIATION, INC.

## **Industry News Digest**

### **Monroney's Proposal Threatens** Administration Control of CAA

As Congress prepared to convene this week, it was increasingly clear that the Administration stood in real danger of losing its grip on the Civil Aeronautics Administration, via an Act of Separation as proposed by Senate Aviation Subcommittee Chairman A. S. Mike Monroney (D-Okla.). (See story on p.

Monroney, who has announced hearings will open January 4 into the related questions of the forced resignation of former CAA Administrator Fred B. Lee and legislation separating CAA from the Commerce Department, has given Commerce officials reason for the uproar" reported to be raging there.

 An acknowledged master of legislative strategy-as attested by his oneman performance in steering the quarterbillion-dollar Aid-to-Airports bill through Congress over Administration opposition -Monroney has confronted the Department with this formidable position:

• He has championed the cause of a popular Republican, Lee, who some believe was unfairly dismissed by the very Administration which appointed him.

• He has used the Lee case to illustrate what he contends is Administration hostility toward civil aviation's progress and favoritism toward surface transportation, especially the railroads.

• He holds up aviation as a symbol of progress, and the Administration as a symbol of the status quo.

• He has peppered the public, through the press, with a persuasive barrage of statements-building a popular case which will be difficult for the Administration to oppose.

· Significantly, Monroney has collected impressive support from both houses of Congress. It includes the chairmen of the Commerce Committees, through which the CAA legislation must be processed, and the House Democratic whip, Rep. Carl Albert (D-Okla.). More important, perhaps, no significant Congressional figure has yet countered Monroney publicly.

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There is no doubt that the Oklahoma Democrat is serious about his anti-Administration campaign. He is proud of his Aid-to-Airports program and his Permanent Certification for Local Service Carriers bill. He resents the dismissal of Fred Lee, who he says helped him greatly, and the departure of his old friend Josh Lee from CAB.

Monroney has long been concerned about railroad efforts to shift the Federal regulatory balance in their favor, and believes the Republican Commerce Department is committed to this end.

The least that can be said of Monroney is that he is a tenacious, able, formidable opponent.

### IAS Names Dr. Sharp President for 1956

The Institute of the Aeronautical Sciences has elected Dr. E. R. Sharp, director of the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics, president for 1956.

Dr. Sharp succeeds Robert E. Gross, president and board chairman of Lockheed Aircraft Corp., as IAS head, He will be installed during "Honors Night" ceremonies January 23.

IAS Council also named four vice presidents and a treasurer for 1956. Elected vice presidents were W. B. Bergen, executive v.p.-The Glenn L. Mar-tin Co.; V. E. Carbonara, president-Kollsman Instrument Corp.; Edgar Schmued, v.p. engineering-Northrop Aircraft, Inc. and R. C. Sebold, v.p. engineering-Convair.

Sherman M. Fairchild of New York

was elected treasurer.

### Trailer Van Gets Lift from XH-17



Lift of this big Air Force trailer van completed tests of the XH-17, built by Aircraft Division of Hughes Tool Co., Culver City, Calif. Copter is powered by a pair of General Electric J35 turbojets. Gas pressure is bled from the two jets and fed to burners at rotor tips to turn the main rotor blades.



### Martin Mariner Gets a Lift

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A hydro-ski has been fitted to a modified Martin PBM seaplane as a shock absorber in rough water landings and takeoffs. The ski is mounted rigidly on a single strut and is approximately one-fifth the length of the Mariner. Ski was built by Edo Corp.

### PAA Buys Stretched Version of 707

Pan American World Airways last week became the first airline to make a substantial modification in its order for jet transports by announcing the purchase of 12 Boeing Intercontinental Stratoliners.

The new order, which affects an undisclosed portion of PAA's original order for 20 standard 707 jets, now totally obscures the exact number of Boeing jets the airline is buying. Reliable sources, however, place that figure at 22, with the 12 long-range 707s displacing 10 of the standard models previously ordered.

Pan American also reportedly holds an option for additional Intercontinental

Ms numbering up to 15.

In announcing the new order, PAA said deliveries of the shorter range air-raft will begin in December 1958 as previously announced. First delivery of the long-range model is set for August 1959.

In a joint announcement with PAA, Being also confirmed for the first time these performance details of the Interminiental jet:

Gross Weight—290,000 pounds, 50,000 pounds higher than the standard 707.

Capacity—Standard seating of 124 with tourist layout for 145 passengers.

Comparable 707 capacities are 104 and 125 respectively.

Range—Over 4,000 miles with full payload and fuel reserves.

Payload 36,500 pounds, more than 8,500 pounds higher than standard

Length-146 ft. 8 in. (12 ft. 2 in. increase).

Span-141 ft. 6 in. (10 ft. 8 in. increase).

Fuel Capacity—21,200 (3,800 gal. increase).

### Air France, Sabena To Get Boeing Jets

Boeing Airplane Co. registered its first successful penetration of the foreign airline jet market last week with orders for 13 of its Intercontinental 707 Stratoliners from Air France and Sabena Belgian Airlines.

Air France ordered 10 of the longrange Boeings for delivery between November 15, 1959 and November of 1960. It also holds an option for an undisclosed number of additional 707s.

Sabena's order with Boeing is for three Intercontinental 707s at a price of \$15,450,000 for delivery in December 1959, January 1960 and February 1960.

### Tanagra Orders DC-8s

Pan American-Grace Airways at press time announced a \$25-million order for four Douglas DC-8 jet transports for early 1960 delivery. Tanagra's contract with Douglas also includes an option on two additional aircraft.

### Ryan to Build DC-8 Pods

Ryan Aeronautical Co. will build jet engine power packages for Douglas DC-8 jet transports under a contract award from Douglas Aircraft Co. valued at \$20 million.

The Douglas order, which involves jet packs and pylons for both the Pratt & Whitney J57 and "a later, more powerful jet" (presumably the J75) engine, brings Ryan's backlog of unfilled orders to more than \$50 million.

### World's Airlines Flew 69 Million Passengers In 1955: Total Up 17% Over 1954

Year-end estimated figures released by the International Civil Aviation Organization show that the world's airlines (Russia and Red China excluded) carried 69,000,000 passengers in 1955, 17% more than in 1954. Each passenger flew an average distance of 559 miles.

The development of world civil aviation since 1937 is shown in the

following ICAO-prepared tables:

	Flown	Passengers Carried	Passenger- Miles	Cargo Ton- Miles		Average number of passengers per aircraft	Average distance flown per passenger	
		(Millions)	(Millions)	(Millions)	(Million	is) (number)		
	1,407	69.0	38,530	907	257	27.4	559	
	1,265	59.0	32,620	760	223	25.8	553	
	1,165	52.4	28,900	710	188	24.8	551	
1952	1,059	45.0	24,540	668	175	23.2	547	
1951	976	39.9	21,380	620	160	21.9	536	
1950	890	31.2	16,960	518	143	19.1	544	
1949	836	26.5	14,480	390	128	17.3	546	
1948	789	23.5	12,990	286	114	16.5	552	
1947	708	21.0	11,740	187	88	16.6	559	
1946	584	18.2	9,630	82	67	16.5	529	
1945	373	9.3	5,100	77	90	13.7	548	
1937	165	2.5	880	n.a.	n.a.	5.3	350	
		Increase	or Decrea	se Betwee	n Years	3		
1954-55	+11%		+ 18%	+ 19%	+ 15%	6 + 6%	+1%	
1947-55	+999		+2289	6 +385%	+1939	6 +65%	hotelesson	
1953-54	+ 9%	+ 13%	+ 13%	+ 7%	+ 199	6 + 4%	+1%	
1952-53	+10%	+ 16%	+ 18%	+ 6%	+ 79	6 + 7%	+1%	
1951-52	+ 9%	+ 13%	+ 15%	+ 8%	+ 99	6 + 6%	+2%	
1950-51	+10%	+ 28%	+ 26%	+ 20%	+ 129	6 +15%	-1%	
1949-50	+ 6%	+ 18%	+ 17%	+ 33%	+ 12%	6 +10%	-1%	
1948-49	+ 6%	+ 13%	+ 11%	+ 36%	+ 13%	6 + 5%	-1%	
1947-48	+11%	+ 12%	+ 11%	+ 53%	+ 30%	6 - 1%	-1%	
1946-47	+21%	+ 15%	+ 22%	+128%	+ 31%	6 + 1%	+6%	
1945-46	+57%	+ 96%	+ 89%	+ 6%	- 26%		-3%	
n.a	-not availab	ile.						



# JACK & HEINTZ A-C SYSTEMPO

### First Thermal Class "C" A-C Electric System to be put into production

With flight performance and punching power ranking it one of the world's most advanced interceptors, the F-102A imposes accessory-affecting environments that test the limits of the new military Class "C" specifications.

To insure maximum available electric power under these severe conditions, Jack & Heintz developed an a-c system distinguished by several engineering achievements:

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- First Hi-Phase\* voltage regulator protecting against phase overvoltage caused by asymmetrical fault conditions including open sensing leads. Static-magnetic-amplifier design.
- First control panel using a new gas-discharge overvoltage detection tube insensitive to acceleration.

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# POWERS CONVAIR F-102A







These photos taken on the F-102A production line at the Convair Div. of General Dynamics Corp. show the three Jack & Heintz a-c system components in process of installation. The

generator (left) mounted with a Sundstrand constant-speed drive is located in the aft fuselage. The control panel (center) and voltage regulator (right) are mounted in the ship's nose.

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### Russia Between Haircuts

TO the tourist of a few weeks, the Soviet Union is a study of sharp contrasts. On top of a largely backward people and economy by western standards, an industrial overlay has been foisted with obvious great strains and sacrifices. High performance is exhibited side by side with obsolescence, inefficiency and waste of manpower.

Since experts who have devoted lifetimes to trying to fathom the depths of that large multi-lingual and multi-racial nation are frank to admit they are still baffled, the casual tourist of a few weeks, such as this writer was just recently, must rely only on superficial observations, his eyes, and the passing scene. This writer's trip was, in fact, "between haircuts."

But even on such a casual and brief trip the traveler to Russia and the satellites cannot help but come into contact with some aviation activities.

On the military side, you can drive by aircraft plants without seeing a single airplane; there are no wire fences for the passerby to peer through as in the U.S. You can pass by military airports and see but little. Or you can pass over or near a military airport while on an airline flight and get glimpses of jet fighters and other equipment on the ground. The most likely experience is jet fighter training both by day and night at such cities as Odessa on the Black Sea.

The civil side is quite open. The existence of both Soviet and satellite airlines has certainly been no secret. But it is when you cross the Iron Curtain and begin moving about on the other side that you become fully aware of a complete well-integrated and self-sufficient network of air service serving the Communist countries. In outline it is as complete a network as that of western Europe. One becomes fascinated by the meshing of the east and west systems at points on one side or the other of the Curtain, such as Helsinki, Berlin, Prague and Vienna.

Having flown a total of four separate flights with Aeroflot (U.S.S.R.) and one each with CSA (Czechoslovakian) and MALEV (Hungarian), this writer can only conclude that the Communist network is striving with determination to bring its operations, passenger handling and other procedures, up to the standards of the west.

What's it like? Lift yourself back 20 years to the DC-3 days in the U.S., and you have it. All equipment is twin-engined, all unpressurized. Maximum seating is 21 passengers. Airport terminals are comparable in handling capability to those in the U.S. two decades

Operationally this writer encountered only smooth and routine flights. There was no hedgehopping. Altitudes of 3,000 to 8,000 feet were maintained in day, night and instrument conditions. Engines were smooth. There were engine runups of various degrees before all takeoffs. Approaches and landings were good and routine. There is pre-flight checking of weather. Out of six flights, seat belts were available on five. But only on two were they workable. Seat belts are still considered largely unnecessary behind the Curtain. Stewardesses were on four out of six flights.

In other respects it is clear that the Communist airlines are trying hard to standardize with the west. IATA bulletins and aids are eagerly studied and used. The international ticket of the west and all of the intricate procedures which it involves is now standard. And Aeroflot has just recently introduced a ticket envelope which contains not only a postcard showing an airplane in flight but (1) a postal form for the mailing of complaints and suggestions to management and (2) a card in Russian and English listing such items as lemonade, mineral water, tea, biscuits and candy as being available from the stewardess.

There is every effort, apparently, to improve the entire airline network. They are expecting more and more foreign visitors. Courtesy to westerners is evident everywhere. This writer was well and kindly treated at all times; in fact there was a great effort to be friendly and courteous.

In numbers of passengers carried and frequency of flights, the east lags far behind the west. For one reason, the citizenry behind the Curtain are scarcely free agents to travel at will. The bulk of passengers are on some sort of bureaucratic or diplomatic business.

For the future, who can say? It is probable that the U.S.S.R. will jump from twin-engined types to jet. It has been reported that Aeroflot has at least three twin-engined turbojet transports for the launching of service to the Far East this year, although little is known about this project as yet. If any four-engined types are ready for service soon there is no indication available. Observed for what it is, a network of equipment which the west considers antiquated, the Communist airline services make a good impression. They're trying hard.

In En Route at the rear of this issue and continuing for quite a few issues in the future, this writer will endeavor to portray in words his experiences and impressions of a "between haircuts" trip through the strange but fascinating world on the other side of the Iron Curtain.

### The Nonsked Decision

To the Editor:

In the December 5 issue of this magazine the Editor wrote an editorial entitled "Reckless . . . and Irresponsible" in which he castigated the majority of the Civil Aeronautics Board for the Decision in the Large Irregular Air Carrier Investigation.

We differ strongly with the editorial. We consider that it constituted an unfair and unwarranted attack upon three Members of the Board.

The Large Irregular Air Carrier Case went on for more than four years. hearings before the Examiners lasted more than twenty months. It is the longest Case and the largest record ever developed in a CAB hearing. Every party had extensive opportunity present policy witnesses and evidence, cross-examination, file briefs conduct and exceptions, and make oral argument. The leading airlines and the common carrier railroads made full use of this opportunity. It may fairly be said that every point of view was represented in the Case and all sides of the question fully developed.

On the basis of this extensive record the Board finally handed down its policy Decision. What the Board has done in this policy Decision is to mark out a sphere of operations in air transportation for a newly designated class of "Supplemental Air Carrier." Additional hearings are going on to determine which carriers ought to be given this authority. Only those carriers found fit are to be permitted to continue operations as Supplemental Air Carriers. Among the disappointed litigants, in addition to certificated carriers, will be those irregular carriers who may be disqualified at the further findings to be made on individual fitness. So the Editor's charge that the Board has "whitewashed the non-skeds" is com-pletely in error. The correct place to consider violations is when you consider the case of the carrier that has alleg-edly committed the violations.

In this policy Decision, the Board was unanimous on the question of granting practically unlimited charter rights to the carriers. There is no sub-stantial argument on this point. The minority of the Board and the Editor disagreed with the majority in permitting the carriers to fly ten round trips per month between any pair of points in the U.S. or its possessions on an individually ticketed or waybilled basis. But on this point the Senate Select Committee on Small Business has twice recommended, after extensive hearings, that the irregulars be given the right to do fourteen round trips per month between any pair of points. The first committee to so recommend was headed by Senator Sparkman, a Democrat. The second committee to so recommend was headed by Senator Thye, a Republican.

Are Senators Thye and Sparkman, and the other Senators who served on these committees and made recommendations, to be cons these recommendations, to considered reckless and irresponsible?

In permitting ten round trips per month the Board has not authorized the irregulars to engage in a new type of operation for which they were not previously authorized. The carriers have had the right to run between eight and twelve trips per month between any two pair of points, so long as they operated such trips on an irregular and infrequent basis. The old regulation under which such individually ticketed or waybilled operations were performed admittedly been indefinite, uncertain, and difficult to interpret and apply. The Board Decision, by removing the prohibition against regularity and by stating an exact numerical limitation, is certain to make the regulations easier to enforce. By placing a specific numerical limitation upon the number individually ticketed flights the Board's enforcement problems will be greatly simplified. Moreover, the irregular carriers who have in the past violated the regulation have never been content to abide by any limitation, much less ten flights per month.

Demands for air transport service of all kinds have been multiplying even faster than the phenomenal growth in own country's, and the world's population. One of the results of this increasing demand has been an increase in the operations of the domestic trunk line carriers between 1946 and 1954 from 5,962,142,000 revenue passenger to 16,331,348,000 revenue miles senger miles. The prospect is that these 1954 figures will be at least doubled by 1960.

clear that the Board considered that some flexibility within reasonable limits in this expanding market would have no adverse effect on the certificated carriers but only provide an added incentive for all carriers to give better service to the public. It should be noted that the Board has specifically reserved the right to revise downward the "10 per month" authority should there be adverse effect upon the certificated industry.

The public demand for supplemental service is not confined to a demand for charter service. The Board noted that "the irregular air carriers fill an important need for individually ticketed travel created by periodic demands which exceed the capacities of the certificated carriers. Such excess demands are . . . holiday travel, summer and winter vacations, closing and opening of schools, conventions, etc. Even in . a normal or average season, the demand . . . will vary on different days of the week." There are inevitably times when a particular carrier cannot meet such excess demands. The Supplemental Air Carrier with authority to do ten trips per month between any pair of points should be able to fill this gap.

The irregular carriers have demonstrated before, during, and since the Korean War that they can and do provide much needed airlift to all points of the world for military troops and supplies. But in the lulls and cut-backs in military forces between emergencies, some utilization must be made of the equipment, crews and facilities of the carriers who stand immediately ready to furnish airlift for the military. The opportunity to provide charter service and a limited number of individually

ticketed or waybilled trips will help to preserve the airlift potential for such emergencies.

The Board had to weigh these points and many others in arriving at its Decision. It is impossible to do justice to it in a short space or summary. The best answer to the editorial is a careful reading of the majority

> RAMSAY D. POTTS, JR. President, Independent Military Air Transport Association

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Washington, D. C.

### 'Ode' to An Editor

To the Editor:

Knowing your devotion to the principles of Voltaire, I thought you might see fit to publish the enclosed which of course, is written in a spirit of good clean fun.

### STANZAS TO WAYNE

I

There is a noble man named Parrish Whose opinions are bold—even sarish For the Smith, C. R., he will ever do uw But as for the Non-Skeds, he's bearish

11

He was busy with dates when last in the States In his person all power was vested. He hung up the sun-put vice on the run, And on the Seventh day he rested.

### III

He'll fight for the right with all his might And ferret out every faker Provided, of course, he's cleared from his Source Patterson and Trippe and Baker.

### IV

He's an authority, too on Docket 5132; He knows the decision was wrong For he can digest a 5-year quest In an opinion one page long.

He says we can't afford not to clean w the Board; His formula is simple, you'll agree. Just retain the minority and fire the majority,
And hang Rizley and Adams and Lee.

### VI

So let's sing his praise for the rest our days For his virtues let's all give a shout; And so our way saily-all reading as DAILY,

Often wrong but never in doubt!

COATES LEAR, Attorney

Cafritz Building, Washington, D. C.

(Continued on page 14)

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### Letters

### Who's 'Reckless and Irresponsible?'

To the Editor:

I want to congratulate you on the editorial in the December 5 issue of the magazine titled "Reckless . . . and Irresponsible."

I think that we all have a tendency, too often, to be too polite when the occasion warrants precisely the opposite attitude. I feel that the Board's decision in the Large Irregular Case, coupled as it is with its decision in the ACTA-IMATA Case, is deserving of the contumely contained in your editorial.

In the years of my association with air transportation, I have seen no more damaging judgments than those con-tained in those two decisions, which must be considered together.

STANLEY GEWIRTZ
Executive Assistant to the President.

Air Transport Association of America Washington 6, D. C.

To the Editor:

Reading your "Reckless . Irresponsible" editorial (Dece and editorial (December 5, 1955), I was struck by a familiar chord. It occurred to me that I had read the same dire predictions before. Research through your earlier editorials clarified this impression: it was the authorization of airfreight forwarders—not supplemental carriers—which your editorial said would be a "tragic and historical error" (July 15, 1947). And, it was the Airfreight Case—not Docket No. 5132 which you saw as a "new transcontinental route case" for mail and pas-sengers (June 15, 1949).

As a prophet of doom, your batting average is lower than that of the Washington ball club.

> ALBERT F. BEITEL Morris, Pearce, Gardner & Pratt

American Security Building Washington 5, D. C.

To the Editor:

I would like to extend my congratulations to your magazine and staff for the years of invaluable background and information I have gleaned from its pages.

But in regard to the editorial ckless . . . and Irresponsible," I ldn't have headed that piece of "Reckless . couldn't have headed that piece of astute journalism any better, but as

description, not a theme.

When a man, or a handful of men, are charged with the responsibility of maintaining the economic balance of an entire industry, one preciously vital to the security of our nation, there is no room for the type of scurrilous, mudslinging, vicious attacks and innuendos

such as appeared in this editorial.

Mr. Parrish's blunt insinuations about Mr. Rizley's securing a federal judgeship could have been deleted if he had taken the time to read page 79 of the same issue, which reported Mr. Rizley's continued chairmanship being affirmed by President Eisenhower, Mr. Parrish could have sounded a cry of alarm over the CAB decision in question, which, given the full scope adult understanding and appreciation of the problem, would have had I am

sure, a far-reaching effect on the think. ing of all concerned.

Mr. Parrish's personal view sounded not unlike a small boy's squeals when he's been thwarted in his intentions and cannot reason or understand but stamps his foot in impotent rage.

I hold no personal brief for either Mr. Rizley or the nonskeds but I feel there is no room in any responsible publication for the type of writing ap-pearing under Mr. Parrish's name of which the latest "Personal View" is an example. They are by definition, and I quote, "Reckless . . . and Irresponsible."

AN AMERICAN AIRLINES **EMPLOYE** 

(Name withheld by request) New York

To the Editor:

A few days ago I was reading your editorial "Tomorrow May Be Too Late" (November 7 issue) and again last night I was reading it and checked it against some of the news reports. I am convinced that you are throwing a spotlight on a very weak spot in the air structure. Keep up the good work.

EVAN EVANS **Executive Director** National Aviation Education Council

Washington 6, D. C.

To the Editor:

Your editorial, "RECKLESS AND IRRESPONSIBLE," was excellent, but overdue.

> G. T. BAKER President NATIONAL AIRLINES

Miami 42. Florida



### AGAIN . . . THE NAVY ON "OPERATION DEEP-FREEZE" FLIES WITH FEDERAL SKIS

Federal Skis with "LDR" plastic non-stick, non-freeze bottoms will be vital equipment in helping to assure the success of the forthcoming "Operation Deep-Freeze" in the Antarctic. Our experience in practical aircraft ski design since 1925 is available to you. This long background of experience qualifies Federal for consultation concerning all of your present or future equipment requirements. We invite your inquiry.

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## Production Spotlight

- Two Air Force fighters, the McDonnell F-101A and the Lockheed F-104, have exceeded the 1,050-mph set by the Chance Vought F8U-1 Navy fighter. Since Defense Dept. has clamped a lid on speed records, none of these three accomplishments is expected to be made public officially.
- Allison's 550 D1 twin-spool turboprop, now in the development stage, will be a 5,500-hp engine. It probably eventually will become the standard powerplant for the Lockheed Electra.
- Four of the Air Force Century Series of jet fighters have exceeded sonic speed in climbs.
- The Navy has decided on Patrick AFB, Fla., as the launching site for the three-stage Project Vanguard satellite vehicle.
- For "security" reasons, USAF and Convair-Fort Worth can't discuss a modified B-36 flying with a nuclear reactor in the nose for test purposes. But peace officers throughout Texas have been alerted about the radiation danger to crowds if the plane should have trouble.
- Number of aircraft firms working on military applications of atomic energy now stands at 10, with some holding contracts from both the Navy and USAF. AF atomic airframe contractors are Convair, Boeing and Lockheed; engine companies are Curtiss-Wright, General Electric and Pratt & Whitney.
- Navy has given A-powered flying boat contracts to Martin and Convair. Navy's engine researchers are C-W, Allison, GE, Nuclear Development Corp. of America and Garrett Corp. AF has "no comment" on Martin as one of its atomic contractors. Known to be interested in possible military and civil uses of nuclear power are Avco, Bendix, Republic, Grumman and North American.
- There is every indication that the Rolls-Royce Conway will become an important commercial engine despite the abandonment of the Vickers 1000 which it was to have powered. Several European airlines are considering having it installed in the Boeing 707s and Douglas DC-8s while de Havilland is reported to be working on a Comet 5 powered by the by-pass.
- American Airlines has contracted with the Cincinnati firm of Burton-Rodgers Technical Training Aids, Inc. for four Douglas DC-7 "mechanical" cockpit trainers. New units will cost anywhere from 10% to 20% that of electronic flight simulators, and bring the price below the \$100,000 mark. Success with the DC-7 versions could touch off wide-scale use of such a device by airlines which in the past have balked at the high cost of the complex electronic devices.
- Next airline to announce its program for installation of airborne weather radar will probably be Eastern. EAL reportedly is in final negotiation stages or has already signed up for Bendix-built X-Band radar units.
- The research plane North American will build for the Air Force and Navy in cooperation with NACA is called the Advanced Research Aircraft X-15. Powerplant will be a 20,000-pound thrust rocket engine. It is claimed the plane will hit Mach 10 and 250,000 feet.
- The Martin ICBM is designated the "WS 107." Lockheed's loss of the contract to develop it is one overlooked factor in the recent mass resignation of its missile scientists.
- The Navy wants its Project Vanguard scientists to take on an extra job: designating an intermediate range ballistic missile. The rocket men argue they can't handle that assignment and still launch the satellite on schedule.
- Interest is growing in aircraft which can land and take off in about 200 feet, now that vertical takeoff aircraft have been labeled premature. Among the aviation firms working toward development of short takeoff and landing (STOL) aircraft are Fairchild and Ryan.

### When & Where

- Jan. 9-10—National Symposium on Reliability and Quality Control in Electronics sponsored by Institute of Radio Engineers, Statler Hotel, Washington, D. C.
- Jan. 9-13—Society of Automotive Engineers annual meeting, The Sheraton-Cadillac and Hotel Statler, Detroit.
- Jan. 12—Transportation Outlook Conference, Hotel Statler and U.S. Chamber of Commerce, Washington, D. C.
- Jan. 12—Conference on Airport Financing, University of California, Berkeley, Calif.
- Jan. 12-13—Airlines Electronic Engineering Committee of Arinc., general session meeting, Hotel Statler, Washington, D.C.
- Jan. 19-21—National Simulation Conference sponsored by Dallas-Fort Worth Chapter of Institute of Radio Engineen Group on Electronic Computers, Baker Hotel and Republic National Bank Bldg., Dallas, Texas.
- Jan. 23-26—Plant Maintenance and Engineering Conference and Show, Convention Hall, Philadelphia.
- Jan. 23-26—Institute of Aeronautical Sciences 24th annual meeting and Honors Night Dinner, Sheraton-Astor Hotel, New York.
- Feb. 2-3-Mational Symposium on Microwave Techniques, sponsored by Institute of Radio Engineers' Antenna and Propagation Group, and Theory and Techniques Group, Philadelpha.
- Feb. 2-3—Vickers, Inc., first jet engine hydraulic symposium, Park Shelton Hotel, Detroit.
- Feb. 7-9—Eleventh annual conference Reinforced Plastics division of Society of Plastics Industry, Hotel Chalfonts, Atlantic City.
- Feb. 9-11—Eighth Annual Southwestern IRE Conference and Electronics Show, Municipal Auditorium, Oklahoma City.
- Mar. 14-16—American Society of Mechanical Engineers, aviation division conference, Hotel Statler, Los Angeles.
- Feb. 16-17—IRE-AIEE-University of Pennsylvania Conference on Transistor Circuits, Philadelphia.
- Mar. 19-21—Society of Automotive Engineers, National Production meeting and forum, Hotel Statler, Cleveland.
- Mar, 19-22—Institute of Radio Engineer National Convention and Radio Engineering Show, Waldorf-Astoria Hetel and Kingsbridge Armory and Palace, New York.
- April 9-12—Society of Automotive Engineers.
  National aeronautic meeting, aeronautic production forum and aircraft engineering display, Hotel Statist.
  New York.
- Apr. 22-26—Twenty-ninth convention American Association of Airport Executives, Hotel Carter, Cleveland.
- May 1-3—Electronic Components Symposium, sponsored by IRE, ALES, RETMA, WCEMA, NBS, Departments of Defense and Commerce, Department of Interior Auditorium, Washington, D. C.
- May 2—Fourteenth annual conference Society of Aeronautical Weight Engineers, Ft. Worth.
- May 6-9—Second National Flight Test Instrumentation Symposium, Ft. Worth. Tex.
- May 24-26—Tenth annual convention of Armed Forces Communications and Electronics Association, Statler Hotel. Boston.
- May 27-June 3—Annual Convention, Aviation Writers Association, San Francisco
- June 3-8 Summer meeting Society of Automotive Engineers, Hotel Chalfonte, Atlantic City.
- June 17-21—Semiannual meeting Americal Society of Mechanical Engineers Hotel Statler, Cleveland.
- June 19—Tenth session of International Civil Aviation Organization Assembly, Caracas, Venezuela.
- June 20-22—Twenty-seventh meeting Aviation Distributors and Manufactures Association, Grove Park Inn. Asseville, N. C.

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THERE MAY BE TROUBLE AHEAD for military services on Capitol
Hill this spring in getting new money for aircraft and guided
missiles, unless they step up their ordering.

With one-third of fiscal 1956 over, the Air Force, Army and Navy had placed new orders for missiles totaling \$239 million and still had \$1.6 billion unobligated. New plane orders were on the minus side—aircraft deobligations for the July-October period coming to minus \$95 million. Unobligated balance for aircraft at the end of October was \$12.5 billion.

Members of the House and Senate Appropriations Committees traditionally are skeptical of new money requests when the unobligated balance is high.

LOOK FOR SEVERAL NEW MISSILES to move into the operational stage this year. Among them are the Hughes air-to-air Falcon on the Convair F-102 and Northrop F-89H, the Fairchild air-to-underwater Petrel, to be fired from Navy patrol planes, and the Bendix/McDonnell surface-to-air Talos.

Already in service are the Martin Matador, Douglas Nike and Honest John, Firestone Corporal, Chance Vought Regulus and Convair Terrier.

LOOK FOR A NEW 'LOGICAL' Pentagon approach to the release of information on new military aircraft, engines and guided missiles. A proposed directive that would phase the release of data in a manner similar to that used by the Air Force is under preparation by Defense officials for all three services. Army and Navy at present have no set policy on release of information. Scope of the new policy, if signed by Secretary Wilson, would

extend beyond new equipment to include improvements on existing models. Although approval for release of data would vary for aircraft and missiles, both would be governed by the same four "phases" in their development and production life.

Major milestones would include: (1) Preliminary design and studies, Phase I contracts through mockup; (2) Phase II contracts from mockup until first production roll-out; (3) Factory roll-out until receipt of first production plane by combat or training units; and (4) Period after operational units receive production aircraft.

Release schedule for engine data will also involve four phases. They are: (1) During design, drafting of specifications and data; (2) Date of completion of first engine for initial full-scale testing; (3) Date of acceptance of 50-hour qualification test or equivalent; and (4) Date of acceptance of 150-hour qualification test.

FISCAL 1957 SUBSIDY REQUESTS BY CAB from Congress will probably hit a new low. Subsidy reductions, application of the "offset" principle and existence of some carryover monies all point in that direction. Total request will be substantially less than half that received last year.

However, much of the reduction is not of a resurring nature

and a higher figure undoubtedly will be required a year from now.

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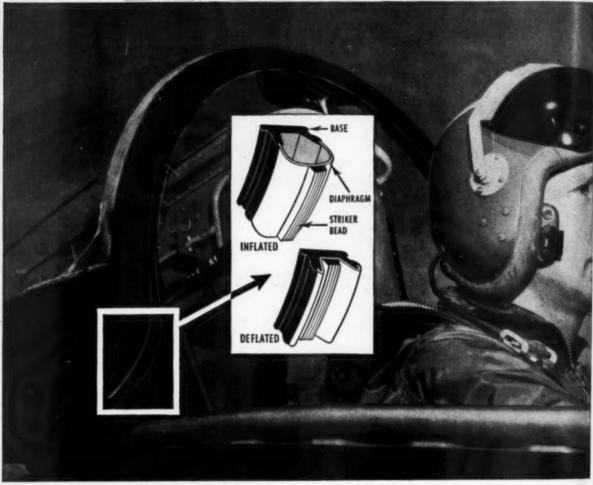
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B. F. Goodrich engineers developed a patented inflatable band of rubber that seals under low pressure without strain. A special rubber-coated fabric diaphragm is cured to a solid rubber base. When inflated, the rubberized fabric lifts a "sealing bead" against the canopy to make an air-tight seal with no stretching of the rubber.

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MNUARY



### **INDUSTRY OUTLOOK FOR '56**

# 8,000 New Planes, \$8 Billion in Sales, More Guided Missile Deliveries

- Rise in missile production should offset slight decline in airframes.
- Increase in backlog likely; relatively stable employment foreseen.

### By ROBERT M. LOEBELSON

As 1956 begins, the nation's aircraft industry can look forward to another year of high-level production, relatively stable employment and sales topping \$8 billion.

Although the country's airframe, engine and propeller companies do not expect 1956 to equal 1955's 8,400 aircraft for the military services and 4,500 civil planes, production measured in terms of airframe weight will fall off only slightly.

- For the coming year, this is what the industry visualizes:
- Just under 8,000 military planes.
   Increased guided missile deliveries to offset most of the airframe decline.
- About 4,700 civil transport and
- Sales of more than \$8 billion.

• An increase in the backlog. (In September-October of 1955, the industry's unfilled orders stood at \$13.9 billion, including \$11.1 billion worth of military planes and \$2.8 billion for civil aircraft. At that same time the Navy and Air Force had sums totaling \$14.9 billion unobligated but set aside for aircraft and related equipment).

With all this, however, deliveries of mansport aircraft in 1956 will involve solely piston-driven planes. Despite a nath of orders for Douglas DC-8s, Boeing 707s and Lockheed turboprop Electras in the last half of 1955, neither of the two jets nor the turboprop airliner will be ready for delivery this year. As a matter of fact, it will be at least mid-1958 before any of the three planes appears in service. Fairchild may be the first American manufacturer to get a gas-turbine-powered airliner in service it it succeeds in producing the first

turboprop Dart-powered Fokker-designed Friendship for a local service carrier by the end of 1957.

• On the military side, deliveries of the Boeing B-52 will go up along with production of the supersonic century series of fighters, including the North American F-100, McDonnell F-101, Convair F-102 and Lockheed F-104. By the end of calendar 1956, the Air Force should be well on its way to the 137-wing goal, with about 134 wings expected to be activated at that time.

## U.S. to Spend \$1 Billion In '57 for Missiles—Wilson

Spending for guided missiles in 1957 will top \$1 billion, Defense Secretary Chales E. Wilson hinted last month as he told newsmen that the Defense Department's requests for funds in the fiscal 1957 defense budget would amount to \$35.5 billion. The '57 budget will exceed that of 1956—\$33 billion—by somewhat less than \$2 billion, the secretary disclosed.

During the year, the Navy's modernization program should be stepped up as some of the hotter aircraft get into larger-scale production. Included would be the Grumman F11F-1, Douglas A4D and F4D, Chance Vought's F8U and a limited number of Martin P6M Seamasters. By next December, there should be a very high percentage of modern types in the 17 carrier air groups, which will total just over 10,000 first line aircraft.

### **New Types to Appear**

 Several new aircraft types will make their appearance during the year.
 Among them will be the XB-58 Convair supersonic bomber, Douglas C-133 turboprop transport, the Lockheed F-104B (with General Electric's J79 engine) and the Boeing KC-135 jet tanker.

Others which are not expected to reach the flight-test stage in 1956 but upon which there will be extensive development effort during the coming 12 months are Douglas' 100,000-pound-payload XC-132, McDonnell's F4H for the Navy, Lockheed's KCX supersonic jet tanker-transport and various atomic-powered aircraft, including the Boeing and Convair bombers for the Air Force and the Convair and Martin flying boats for the Navy.

It is also probable that during 1956 the Air Force will narrow the number of competitors for three new types of planes it is planning for the future. Northrop, Lockheed and North American are all working up designs for a Mach 2 interceptor with a combat radius of 1,000 miles under Phase I contracts. Similarly, Republic and North American are designing high-performance fighter-bombers and Martin and Douglas are proceeding with development of tactical bombers.

### Sales Volume Up

- The year just ended was also a highly significant one for the aircraft industry. Although fewer planes were produced in 1955 than in 1954, sales volume climbed from \$8.3 billion to \$8.4 billion during the period. Four main factors were responsible:
- Weight and cost of 1955's military aircraft was greater than in previous years.
- Output by aircraft companies involved missiles to a greater degree than ever before.
  - Dollar volume of commercial

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sales was higher.

A high level of research and development activities.

• In 1955, military plane production averaged about 700 a month, or 8,400 units for the year. A year earlier, military output had totaled 9,600 planes. The decrease had been expected, as the military services came closer to their June 1957 goals of 137 wings for the Air Force and 17 carrier air groups for the Navy. Much of the reduction, however, was offset by increased missile deliveries.

Civilian production in 1955 aggregated 4,500 aircraft, about 1,000 more than in 1954. Utility planes accounted for most of the increase (4,250 vs. 3,071 in 1954) and dollar volume of light-planes also went up sharply (\$75 million vs. \$43.4 million in 1954). Most of the increased dollar sales were attributable to the demand for larger and heavier utility planes, especially twin-engine types.

Airliner deliveries in 1955 amounted to 280, compared with 291 a year earlier. But in 1955, the three major builders of piston transports, Douglas, Boeing and Convair, continued to book new orders for Super Constellations, DC-6s and 7s, and Model 440s.

• Most radical innovation last year was the decision of several major U.S. and domestic airlines that the time had come to place orders for jet and turboprop equipment. By year's end, Lockheed had 114 of its turboprop Electraordered or on option (American Airlines 35, Eastern 40 firm, 30 optional, Braniff 9).

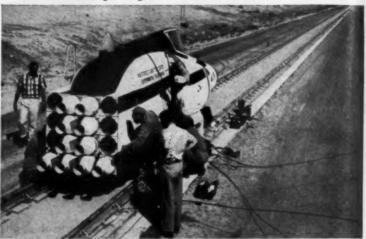
Boeing's firm backlog for 707s came to 59 planes (Pan American 20, American 30, Braniff 5, Continental 4) plus an option for five held by Sabena. Douglas' DC-8 orders total 91 (Pan Am 25, Eastern 18, United 30, KLM 8, National 6 and Japan Air Lines 4) and Eastern has taken an option on eight more.

In addition to these civil orders for gas-turbine-powered aircraft, the Air Force has already placed orders (or will) for about 300 Boeing KC-135 jet tanker versions of the 707. These orders will bring the USAF's commitment on the KC-135 to about \$700 million.

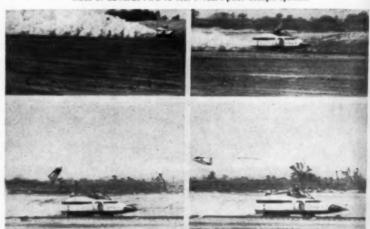
Moreover, the Military Air Transport Service has already indicated to AF headquarters a desire for 30 or more jet airliners for cargo, passenger or air evacuation use. And it is not unlikely that the Navy will find a similar requirement.

Thus, as the new year starts, the aircraft industry is in healthy condition, with a very satisfactory year just completed and prospects for 1956 bright.

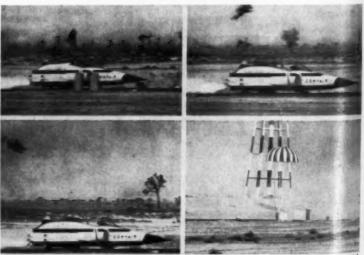
### F-102A Escape System Gets Rocket Sled Test



Up to 16 rocket motors propel Convair rocket sled beyond Mach 1 along 10,000-foot track at Edwards AFB to test F-102A pilot escape system.



High speed sequence cameras and 1,000-frame/second motion picture film record events as powder charge blasts canopy open and seat ejection begins. Total sequence shown here involves less than one-half second.



Dummy pilot and ejection seat clear the cockpit of F-102A nose section used with sled, then continue upward trajectory that carries them above aircraft's vertical fin. Dummy and seat automatically separate at peak of trajectory and parachute floats "unharmed" dummy to a landing.

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## M-Day Machine Tool Policies Undergo Major Overhaul; Restrictions ased

By HENRY T. SIMMONS

The government's mobilization policies dealing with machine tools and production equipment are undergoing a thorough revision at the hands of officials in the Pentagon and the Office of Defense Mobilization.

The objective: to convert the static and frequently untouchable mass of equipment in the military tool inventory to a dynamic body of equipment geared at all times for emergency use.

The forthcoming changes will affect two broad phases of the machine
tool mobilization program: ODM's rules
for handling "packages" of tools owned
by the Defense Department and other
tederal agencies; the Pentagon's \$200
million Reserve Tool Program, suspended last month after it barely got
under way.

• For aircraft builders, the proposed changes—if adopted—will bring a relaxation in the restrictions on use of government-owned tools now held in unbreakable packages, and make a greater variety of military-owned tools available to them for use in current production work.

Though many of the details of the new policy are still nebulous, here are

some of the things the mobilization planners have in mind:

 Provide for an annual review of all packages of government-owned production equipment to make sure that they have not become obsolete.

 Make the tools available for current production or dispose of them, where packages are no longer up-todate because the end item to be procured no longer figures in military requirements.

• Seek a revision in the language of the appropriations for the Reserve Tool Program to permit use of tools procured with these funds for current production in certain situations.

• Develop improved procedures permitting the military services to draw upon one another's stores of production equipment in emergency situations.

The proposed revision of ODM rules, notably Defense Mobilization Orders VII-4 and VII-7, will be fairly simple to carry out since they do not require Congressional action. Issued more than a year ago, these orders set forth the government's policy for maintaining the nation's mobilization readiness, particularly with respect to government-owned tools.

Among other things, the orders require that tools purchased to manufacture military goods no longer in production must be held in tight packages against the day when the goods might be needed again.

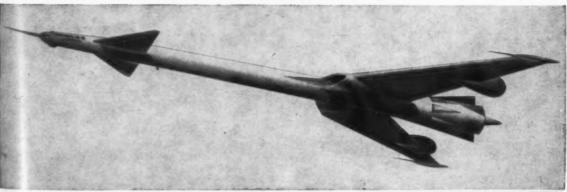
While these restrictions might be adequate to prevent dissipation of vital tools, the mobilizers think that's only part of the problem. They've been increasingly troubled by the idea that some military items may never be purchased again, or at least not in the quantities they were originally purchased.

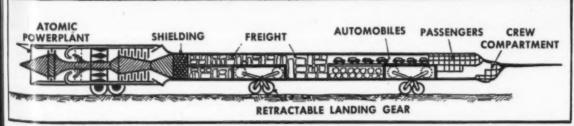
### What to Do?

• As a sample of what's bothering the mobilizers, take the case of the J47 engine. During the Korean War, it was turned out by General Electric Co., the primary source, and two secondary sources, Studebaker and Packard. It's conceivable that GE might be asked to step up its production of the powerplant in event of a new emergency, the planners say, but they doubt that the second sources would be asked to go back to work also.

This raises the question of what to do with the tools which the government supplied the companies to manufacture the engines. If they are never to be used again, why continue to hold them in sacrosanct packages when some of the individual tools might be useful for other jobs?

### What Russia's Future Atomic Aircraft May Look Like





Ressia's future atomic aircraft may look like the above illustrations which accompanied a recent popular style article in the Soviet Inchnicol press by Professor G. I. Pokrovski. The atomic powerplant will be completed detachable from the airframe and when not installed will be buried in the ground. Professor Pokrovski explains that the powerplant must be as far to the rear as possible to give passengers maximum protection from radiation. Hence the reason for the very long and narrow fuselage.

AVIATION

To keep these packages up-to-date, the mobilizers expect to call for an annual review of each group of tools by the services to determine whether the end item which they can build rates any chance of production in event of a future emergency. If the decision is no, the packages would be broken open and the tools made available for use in current production projects or transferred to the services' idle inventories for possible future use. If they are completely obsolete, they would be sold.

· More difficult is the problem presented by the Reserve Tool Program. This got its start from a set of farreaching recommendations put forth late in 1952 by a special ODM advisory committee headed by Harold Vance, then chairman of the Studebaker Corp. His group, among other things, proposed that the government undertake a \$500 million program to buy long lead-time tools and production facilities to "fill the gaps" in the nation's mobilization base.

Despite the lukewarm position taken by Defense Secretary Wilson on the need for the program, Congress appropriated \$250 million for fiscal 1954 with the proviso that the money be used exclusively for the long lead-time facilities and that any funds left unobligated at the end of the fiscal year would lapse. The entire appropriation expired on June 30, 1954, with not a penny of it

• Congress subsequently voted \$100 million for fiscal 1955 and another \$100 million for the current year. The appropriation for last fiscal year was apportioned among the services with the Air Force getting \$84.6 million, the Navy \$14.3 million and the Army \$1.1 million. For a while, it looked as if the program was finally getting off the ground. The Army and Navy obligated all their funds and the AF obligated about \$25 million of its money.

Suddenly, the program was suspended by the Defense Department in November. The reasons given for the action were conflicting. A Pentagon budget official declared that the services had no solid program and "couldn't show any real need" for the tools. He expressed doubt that the program would ever get rolling again.

But officials close to Assistant Defense Secretary Thomas Pike (Supply & Logistics) and Defense Mobilizer Arthur Flemming weren't ready yet to write off the entire Reserve Tool Program. They blamed the difficulty on the

way the program was set up to start with rather than faulty purchase plans by the services.

### Three Faise Starts

· One Pentagon official put it this way: "We had at least three false starts on this program. Each time we got ready to roll, we found that new developments in tools and production equipment threatened to obsolete what we intended to buy. We finally suspended the program to see if we couldn't put some flexibility into it and minimize the built-in obsolescence factor."

At first, the planners thought it would be a good idea to let the unobligated balance of the appropriations lapse and ask Congress for a new appropriation with fewer restrictions. They soon abandoned this idea because it was politically risky, both from the standpoint of Congress and the possibility that Assistant Defense Secretary W. J. McNeil, keeper of the Pentagon purse, might not go along with the idea.

They are now thinking of asking Congress to revise the language of the present appropriations to extend their life and, more important, to permit facili

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### Beech Offers Off-the-Shelf Primary Jet Trainer



Beech Aircraft Corp.'s new two-place tandem jet primary trainer (AMERICAN AVIATION Dec. 19) is being offered to military services in the U.S. and abroad as an off-the-shelf item.

The jet version of the T-34 Mentor has been designated Model 73 and was designed and built to military specification, although privately financed. Powerplant is a J69-T-9 turbojet (Continental Motors version of the Turbomeca Marbore II). Top speed is estimated at 253 knots at 15,000 ft., and stall speed is 60 knots, Gross weight is 4,521 lbs.

Beech says the Model 73 "handles like the T-34 and could be used for training students from the beginning, without using any other airplane for previous training."

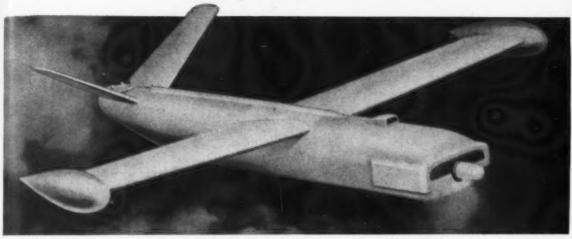
First flight of the jet trainer was made Decem-

ber 18 at Wichita.

The present T-34 Mentor, also first built as a private venture by Beech, is used as the standard trainer for the Air Force and Navy, as well as in Canada, Chile, Colombia, El Salvador and Japan.

AMERICAN AVIATION

### First Details of Beech Target Drone



Navy's newest target drone is the Beech Aircraft XKDB-1, shown in artist's sketch. Beech developed the drone as an initial contribution from the company's new guided missile division at Boulder, Colo. Propeller-driven target is remotely controlled for ground-to-air and air-to-air crew training. Designed to float and thereby facilitate recovery at sea, plane is powered by supercharged engine and has a recovery parachute attachment.

facilities purchased with the funds to be used in current production under certain conditions. Several schemes have been advanced which would accomplish this.

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One idea would permit the services to draw upon one another's mobilization reserve of tools in certain types of emergency situations. At the time of the loan, the borrowing service would place an order for a new tool which would eventually replace the tool in the inventory of the lending service.

When the replacement is delivered, it presumably would be the latest model available and therefore superior to the tool which was originally loaned. By putting it into the mobilization reserve, the effectiveness of the reserve would increase in line with the technical progress of the machine tool industry. The tools accumulated by each service would revolve and new equipment would generally tend to replace older items.

Other ideas have been suggested which would permit the services to use tools precured for their mobilization reserves in current production projects for experimental purposes and to build up know-how in the personnel who might eventually be called upon to operate them.

It's too early to say which of these ideas will be adopted, or what their final form will be. But this much is certain: the mobilization planners believe the concept of a mobilization reserve of tools is fundamentally valid, provided there is some means of keeping the reserve in step with the rapid rate of technological progress shown by the machine tool builders. If they can devise

a way to accomplish this, they think they'll have a good chance of getting the Reserve Tool Program back on its feet. ◆◆◆

### Sen. Monroney Says Weeks, Rothschild Unfair to Aviation

The first major battle of the second session of the 84th Congress has already erupted in the halls of Congress and will get a public airing within days of the January 3 reconvening date.

As brought by the Chairman of the Senate Aviation Subcommittee, A. S. Mike Monroney (D-Okla.), the charges are sweeping—no less than that the Department of Commerce under Secretary Sinclair Weeks and Undersecretary Louis Rothschild has subordinated the interests of civil aviation to those of surface transportation generally, and railroads in particular.

While the first shot in the Monroney vs. Weeks campaign was fired over the forced resignation of former CAA Administrator Fred B. Lee—who, Monroney says, will be his first witness this week—the battle lines have extended to include the following items, the first two of which will be considered by the subcommittee simultaneously with the Lee case:

• A proposal to separate the Civil Aeronautics Administration from the Commerce Department—required, Monroney maintains, to permit CAA to promote aviation unhampered by surface interests.

• Insistence that CAA come up with a workable plan for a second Washington National Airport—before, Monroney says, crowded conditions at the airport cause a major catastrophe.

 Appointment of Charles J. Lowen as Lee's successor—because, Monroney charges, Lowen is a political "buddy" of Colorado Republican Governor Dan Thornton.

• Appointment of G. Joseph Minetti to replace CAB Member Josh Lee characterized by Monroney as an attempt to extend Commerce Department control over civil aviation to the Board, Minetti having been associated with Rothschild at the Federal Maritime Board.

A fifth, and most recent, charge—levelled by Rep. Robert H. Mollohan (D-W. Va.)—may be the most serious matter of all. Mollohan believes Lee's ouster may be traceable to opposition expressed by Lee to plans of the Commerce Department to sell CAA's teletypewriter system to a private operator.

Mollohan disclosed a letter written to him by Lee in October, reporting that the CAA had been directed to prepare specifications to accompany advertisement for bids on the communications system. Lee contended, Mollohan said, that the Government could operate the system more cheaply than private operators, from whom CAA would have to lease back the facilities.

All five members of the Senate Aviation Subcommittee have endorsed his CAA investigation, Monroney has reported, though it is evident Republican Senators Payne and Schoeppel are less than enthusiastic about the project.

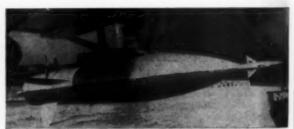
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# French Reveal Details of Guided Missiles

CATEGORY	TYPE	PROPULSION	UTILIZATION	OBSERVATIONS
Ground to ground	SFECMAS	Fuel dry rocket	Anti-tank	Guided by wire. In operational use. Range: 1.3 miles
Ground to ground	ENTAC	Fuel dry rocket	Anti-tank	Guided by wire. In production. Range: 1.3 miles
Ground to ground	SFECMAS 5210		Long Distance at-	Also tested as air to ground. In production for Ground and Air Forces.
Ground to ground	SE 4200	Dry fuel rocket for start, then ramjet	Long distance at- tack, replacing long- range artillery	Range: over 60 miles
Ground to air	SE 4300		Anti aircraft	Comparable to the Nike in tactical experimenta- tion supersonic. Has reached over 65,000 ft. alti- tude. Take-off weight: 1 ton.
Ground to air	PARCA		Anti aircraft	In tactical experimentation supersonic. Take-off weight, 1 ton.
Ground to air	MASALCA		Anti aircraft	Naval missile.
Ground to air	MARUCA		Anti aircraft	Naval missile.
Air to air	MATRA R 051	2 stage dry fuel rocket	Interception missile	In production. Take-off weight, 353 lbs.
Air to air	SFECMAS 5103	2 stage dry fuel rocket	Interception missile	In production. Take-off weight, 286 lbs.
Target missiles	SFECMAS 5501	Ramjet		In production for the 3 Forces and the Royal Navy. On test.
Target missiles	SFECMAS 5510	Turbojet Tur- bomeca "Mar- bere II"		Endurance: 45 minutes. Take-off weight, 1444 lbs.
Scientific	Veronique		-	V2 development. Has reached an altitude of 85 miles.



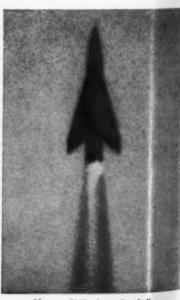
Air-to-air missile (type unknown) under a Meteor fighter.



Matra 05 air-to-air missile.

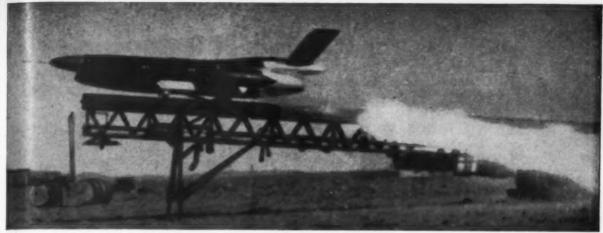


An experimental Snca du Nord missile.

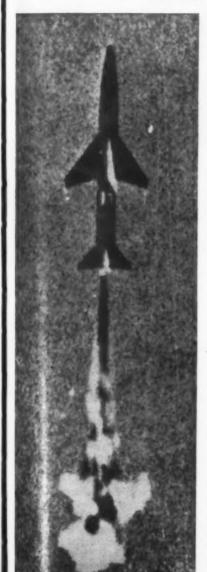


Sfecmes 5103 air-to-air missile.

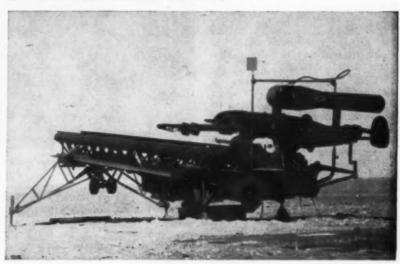
AMERICAN AVIATION



Sfecmas 5510 target missile. Powerplant is a Turbomeca Marbore II jet.



Matra 04 after launching at test station in the Sahara.



Sfecmes 5501 target missile.



Parca anti-aircraft missile being fired.

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# Ryan Tools Up for Its Biggest Production Job

Three hundred jigs in place for fuselage sections of Air Force's Boeing KC-135 jet tanker; many production innovations introduced.

By JOSEPH S. MURPHY

Ryan Aeronautical Co., with more than six years' experience under its belt in building major airframe components for Boeing KC-97 tankers, has reshaped its subcontract production facilities for an even bigger task.

Today, more than 300 jigs, including the largest ever built at Ryan, are in place for production of mid- and aft-fuselage sections of the Air Force's new jet tanker—the Boeing KC-135—at San Diego. Ryan officials say the new project represents probably the largest structure ever subcontracted for in the aircraft industry.

Since December 1954, when the company won its first KC-135 order, tool engineers have been working a 60-hour week, sometimes seven days and 68 hours, to meet an urgent target date for delivery of first units. At the peak of the tooling program, 120 tool designers and jig builders were loaned to Ryan by four aircraft plants to overcome a shortage of personnel in these critical job categories in the San Diego area.

\*Biggest contingent, numbering 35, came from Boeing-Wichita. Fifteen were borrowed from Lockheed Aircraft Corp.'s Georgia division, while others were loaned by Boeing-Seattle and Jonco Aircraft Co. of Shawnee, Okla.



One of the first KC-135 mid-fuselage sections takes shape at Ryan as upper and lower lobes are mated.

Actually, Ryan's contract with Boeing calls for five major KC-135 units—the mid-fuselage, aft-fuselage, wing fairing, dorsal fin and a torque box inside the fuselage to which the stabilizers are attached as an integral part of the flight control system.

Because of the tight schedule set for

KC-135 output, tooling actually began at Ryan before complete engineering information could be made available. Basic tubular structures for the largest jigs were welded and set outdoors to suncure and stabilize dimensionally while drawings were still being prepared to permit setting of precision points.

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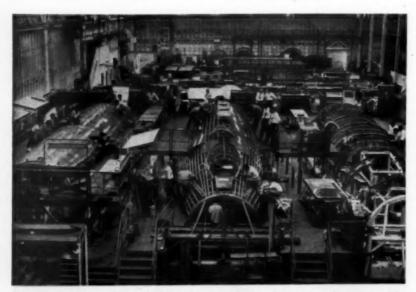
Yet despite this pace, says Ryan tool planning supervisor C. B. Frasier, only one basic design change had to be made, resulting in scrapping of a small fixture which involved no time loss.

### **Major Innovations**

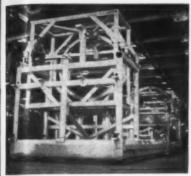
The tooling project alone brought many major innovations at Ryan.

Optical tooling was introduced as the most certain means of guaranteeing accuracy of jigs. Alignment telescopes are used to establish lines of sight to serve as reference points. Distance down the line of sight is figured with a 20-foot micrometer, and an optical micrometer used with the telescope permits extremely accurate measurements.

• An instrument check stand of reinforced concrete weighing four tons and measuring 8 ft. long, 4 ft. high and 3 ft. wide, was built for periodic examination of all instruments to assure constant precision. Such bulk in the stand was necessary to dampen sound vibration from surrounding plant areas and



Ryan KC-135 Program moves into full swing on mid-fuselage fixtures shown here. Upper lobe is produced on fixture at left, while center and right positions are used for lower lobes.



liggest jig yet used at Ryan is this 57-footlang fixture which mates upper and lower labes of Boeing KC-135 mid-fuselage sections.

to provide an inflexible base on which instruments could be calibrated with no "ripple" in the line of sight.

Ryan serves a dual role in the handling of the 40-foot long KC-135 mid-fuselage section. The finished section has a "step" in it and loose skin that is subject to damage in shipment. The dummy ring was developed at Ryan with Boeing approval to maintain the shape of the section both during pressure test and shipping.

As a result, the excess skin can now be bolted to the ring which in turn bolts to a face plate that seals off the and of the section for the pressure test. When the section arrives at Boeing, the face of the dummy ring can be used to rout out the excess skin and the ring shipped back to Ryan for re-use.

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• Spotwelding has literally "taken over" in the KC-135 project. Ryan estimates some 70,000 spotwelds are used in the mid-fuselage section alone for skin splicing and in attachment of doublers and stiffeners to skin.

Company officials believe this is the inst time that skins of such large dimensions have been spotwelded on a production basis.

The big trouble Ryan faced was the necessity of keeping the contour of skin sections while positioning them to the spotweld machines. Spliced sections semetimes measured 25 ft. long when rady to be welded to stringers and the job of keeping their contour perfect at the instant of welding was no small task.

For the single contour skins Ryan devised a special spotwelding positioning table 22 ft. long. For the more complex double contour skins, an overhead rig was engineered to provide four-directional movement. Leveling of the spotweld machine was taken care of an electronic control.

### **Special Dies Designed**

First use of 7075 aluminum alloy Ryan created other needs for tooling recarch and development. Special brated dies had to be designed for severe forming of stringers and other parts. Punch press dies finally adopted employ electrical cartridges. Temperature is controlled by thermocouples.

The KC-135 torque box construction called for drilling and reaming of hardened steel-aluminum sandwich material to close tolerances. A special boring fixture incorporating a thermal compensating aluminum bar assures a minimum of movement due to the differing rate of expansion and contraction of the aluminum and steel.

But these were only a few of the special items brought into play by the new project. Among others: Use of a special saw fixture eliminated the need for 47 mill fixtures to form compound angles on stringer ties in the area where fuselage sections splice together. Ryan adopted plastic-covered stretch form blocks to save tons of kirksite and ease the handling of the blocks. Rough "boiler plate" frames for the blocks were so constructed that when plastic was applied in the model shop, a minimum pour of only ¼ inch and maximum of ½ inch was necessary.

One of the most impressive developments is the mating jig for the upper and lower lobes of the KC-135 midfuselage section. It measures 57 ft. long, 17 ft. high and 14 ft. wide yet manipulate these sections into mating position within a tolerance of plus or minus .010 in.

And airframe subcontracting is not the only area in which Ryan stands to benefit from the Air Force's KC-135 project. For more than six years now it has been producing parts for the Pratt & Whitney J57 engine which powers the jet tanker under contract with its two suppliers—P&W and Ford Motor



Special expanding mandrels developed by Ryan exert 4,800 tons of radial force and stretch J57 skins to diameter for butt welding.

• As early as 1949 it began building large combustion chamber casements and other structures for experimental J57s. Today it is in production on 36 different assemblies for eight versions of the engine. Among these are compressor and turbine cases, flameholder and combustion chamber weldments, afterburner ducts and engine mountings. About 75% of Ryan's work on these items is machining.

A good example of the scope of the machining involved is the J57s forged H-ring. Measuring 3 ft. in diameter, this part weighs 487 pounds when in "rough" form. Ryan machines 397 pounds of metal for this forging in 10 operations that consume nine elapsed hours.

The final assembly weighs 90 pounds and is machined to tolerances of plus or minus .002". To achieve this, the San Diego firm stepped up high temperature alloy machining techniques to take 3/4-inch-wide cuts of metal at 50 rpm and .008-inch feed.



H-ring for Pratt & Whitney J57 jet requires nine hours of machining, is reduced from "rough" weight of 487 pounds to 90 pounds in finished part.



General Electric X-ray unit of 250,000-volt capacity is used to check J57 components for flaws. Machine can penetrate 41/2 inches of steel.

• To combat the difficulties of high-speed grinding of extremely hard J57 parts (primarily the generation of excessive heat that could distort final dimensions) Ryan substituted Excello borers for grinders. Specially carbide-tipped tools attached to the boring bar enabled Ryan to machine, not grind, the parts. Company technicians say this saved 40% of the time and produced a better quality surface.

The special heat-treatable alloy used in the J57 created other problems. Special forming, welding, machining, heating and pickling procedures had to be developed because of its new application.

For example, all welded components must be heat-treated within two hours after welding. Ryan found that because of its high strength properties the alloy develops high residual stresses from localized applications of welding heat. Heat treatment relieves these stresses.

In addition to stress relief, all J57 components are heated in a controlled-atmosphere furnace to 1800°F, tempered and quenched to bring them up to proper strength and hardness. Although the controlled atmosphere doesn't form scale on parts, a new acid pickling bath was engineered to remove the slight furnace blacking that occurs.

Also, for the first time, Ryan installed a program of 100% X-ray inspection of fusion welds. As welding techniques were perfected over the early J57 production program, the frequency of X-ray checks has since been reduced to a sampling sequence.

. Today, the J57 and KC-135 sub-

contracts at Ryan represent a healthy share of its annual gross business. But they are by no means a measure of all the activity under way at its San Diego plant. For while the KC-135 work is phasing in, the last of some 800 or more KC-97 aft-fuselage sections are being completed.

Ryan's new entry for a prime aircraft contract of its own—the experimental Model 69 jet-powered VTO developed for the USAF, now at Edwards AFB Flight Test Center—is soon due to fly (or may already have flown).

• Several months ago, its research and development activities in electronics won a \$5-million Navy order for a new long-range automatic navigation system using continuous-wave radar and inertial guidance system principles. A month before the company was awarded a \$2.5 million USAF contract for advanced development of electronic guidance systems for supersonic missiles.

As recently as two months ago Ryan was assured of production of its Q-2A Firebee jet target drone missiles well into this year. The Q-2A is now undergoing operational suitability testing at Holloman AFB and the Air Force has indicated that the first Firebee operational squadron will soon be activated at Yuma AFB.

Simultaneously with Q-2A trials,

the Navy is testing its version of the Firebee, the KDA-1, at Point Mugu Naval Air Missile Test Center, Calif.

These projects round out the production picture at Ryan—and it's obviously a bright and busy one for 1956.

### Sperry Rand May Open Test Plant at Phoenix

Officials of Sperry-Rand Corp. are still confident the firm will be able to locate a proposed instrument flight test facility and aviation equipment firm at Phoenix, Ariz.

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Still in the path of final decision is an Arizona state tax of 2% on sales to the federal government. However, an S-R spokesman stated recently that there's a good chance the tax will be off the books by the year end and, in this eventuality, the firm would probably proceed with plans to locate there.

### **Douglas Opens New Plant**

Douglas Aircraft Co.'s Santa Monica Division has opened its new plant at Culver City, Calif. and expects employment there to reach 350 by Jan. 31.

The \$2,000,000 plant will produce subassemblies for DC-6B and DC-7 transports as well as aft fuselage sections for the Navy A4D Skyhawk.

### **How Titanium is Rolled into Sheets**



A Mallory-Sharon Titanium Corp. rolling mill at Niles, Ohio, converts 1/2-inch titenium bars into 1/8-inch sheet in a process which sandwiches the titanium between steel sheets to produce superior surfaces. The company expects to double its titanium output next year. Its products go into the Boeing B-52, the North American F-100 and other Century Series fighters and a number of Navy fighter aircraft.

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# Collins 'Divides to Simplify' Its '56 Line

Electronics firm will use military lessons it learned to produce airborne equipment for jet transports and business aircraft.

EDITOR'S NOTE: This is the last of three articles on developments and plans of three manufacturers who produce civil airborne electronic equipment. With the advent of new miniaturized and modularized components, more efficient materials and improved wiring techniques, builders of equipment have been quick to recognize the contributions these elements could make to meet the ever-tightening demands for smaller, lighter equipment. However, the degree of adoption has varied widely.

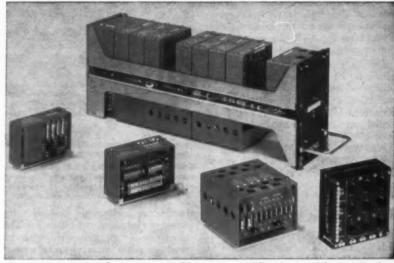
Depending upon the manufacturer's point of view toward packaging, maintenance and experience with the reliability of the new elements, the extent of their application has varied. The first article in this series dealt with a package system concept that emphasized weight-trimming through smaller, lighter chassis designs coupled with conventional circuitry and common power supply capability. Another manufacturer's redesigned layouts, application of new materials and components to accomplish sizeweight reductions were discussed in the second article.

In this exclusive article, another manufacturer reveals his plans for new equipment in 1956, which may be called the "systems concept" year in civil airborne electronics design.

### HENRY P. STEIER

A line of lightweight, compact civil airborne electronic equipment that "learned its lessons" from military developments will make its debut in 1956.

Following the experiences of World War II, with its attendant problems of production, maintenance and logistics in military electronic equipment, the idea of electronic sub-units caught on. Division of electronic circuit functions into sub-units was hailed as a step forward toward solving the problems of manufacturing on a line assembly basis, since assembly lines were no longer dependent upon every component bin and line assembler.



The Collins tubeless AP-101 Automatic Pilot system amplifier showing, left to right, the Type A magnetic amplifier, mixer, Type B magnetic amplifier and auto pilot control panel. Test points and adjustment holes are placed on top of the modules and system test points are placed on the front control panel.

Problems in one part of a circuit were restricted to that assembly line. Also, the sub-units offered the user increased in-service time for his equipment since malfunctioning sub-units could be quickly replaced with a tested counterpart.

Developments like "Project Tinkertoy," use of mass-produced counting and amplifying circuits for computers, component assembly machines, such as ones built by General Mills, Inc. and General Electric Co. (ACAS), all have appeared on the unit-idea scene, together with a new type of engineering called "packaging engineering." These are all part of new production techniques for "automation."

• Collins Radio Co. in 1951 recognized the advantages inherent in the rule of "divide and simplify." But together with division and simplification of construction, Collins wanted its equipment to be more compact, lighter, more dependable, easily altered for custom needs and easily maintained. Collins reasoned that by carefully selecting electrical and physical standards, it could develop power supplies, and standard intermediate frequency, radio frequency and audio frequency amplifiers for use in many different equipments.

To administer a program that would capitalize on the unitization idea,

the company directed a group of its top engineers to form a Modular Standards Committee. This committee was commissioned to set up a code of mechanical and electrical design standards to guide designers of new Collins equipment.

### **Objectives Outlined**

Objectives of the module program were:

- To change the shape factor of a given electronic equipment using a minimum of new sub-units.
- To take sub-units of several sets and assemble them on a common mount, exclusive of their individual cases.
  - Simplified maintenance.
- To modify an existing equipment to change the characteristics with a minimum of redesign.
- To decrease the engineering time for a new design by standardization of module chassis, cooling principles and other details.
- To design a new piece of equipment using existing sub-units for at least a part of it, thus decreasing the number of engineering man-hours required and thereby permitting more design time to be spent on those sub-units that are truly new.

The Collins Co. asserts that, although "module" is generally used to describe a plug-in assembly with a par-

ON

ticular set of dimensions, a correct description would be a "modularly dimen-

sioned sub-assembly."

Size of the modules is set in varied units of one inch. Height is 31/4, 41/2, or 6 inches maximum above the mounting surface. "Line to line" widths of modules is  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $\frac{1}{2}$ , 2,  $\frac{2}{2}$ , 3, 4, 41/2, or 6 inches. Actual module width and length is 1/16 inch less than the "line to line" dimensions. This leaves a nominal 1/16 inch between modules. Module sizes were determined by study of standards for ATR case sizes.

· Emphasis is placed on space utilization. For example, where module standards have been employed, the amount of space for power connectors, mechanical drives and cooling air does not exceed 18 percent of the total cross section area when viewed from the front of the unit. Ratios as low as 7.7 percent have been achieved in current designs. Printed wiring is used extensively in the modules as an aid to manufacturing, reliability and space utilization.

### **Electrical Standards**

Within the General Module Standards are electrical standards selected to permit:

· Reduction of future design time by permitting standardization of circuit types, components, manufacturing tools,

· Simplification of design and reduction in size and weight of the common power supply units for several equipments.

· Plausibility of a series of power supply units that could be readily stocked.

· More research for product improvement.

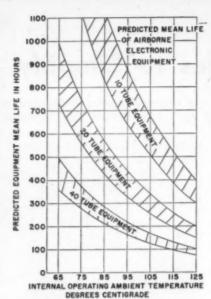
·Greater utilization of engineering

time for unique circuitry.

Collins' experience, which led to the present program, was obtained from their work on the ARC-27 and GRC-27 programs. This work marked the shift by the Air Force to UHF communications, and ended up as the 1750 channel air and ground system of electronic equipment that uses sub-units of functional circuitry held in place by screws.

Today, with the advent of high performance jet aircraft and the increased premium on space and weight, the military and Collins visualize combining modules of various equipments to make a CNI (Communication-Naviation-Identification) package whose functions are dictated by the mission of a particular type plane. This same design method is believed to hold considerable potential for the requirements of civil users.

The company is planning to introduce a new line of equipment with de-



Collins data showing the effect of decreased vacuum tube complement and resulting lower operating ambient temperature on the reliability of airborne electronic equipment.

creased size and weight and with increased performance and reliability. The equipment is being designed with jet transports, light twin business aircraft and military aircraft needs in mind. The systems concept is prominent in the designs. Various units will fit together with a minimum duplication of circuitry. A new VOR receiver is made up of a basic communication receiver, selfcontained, plus a second unit that may be added as necessary for VOR and Localizer instrumentation.

If only simple VOR cross-pointer instrumentation is needed for a lighttwin aircraft, the circuitry containing that function alone need be carried. If full instrumentation including a radio magnetic indicator is required, modules containing the automatic VOR circuitry may be added to the VOR instrumenta-

tion unit.

Rho/theta navigational computer circuitry will be simplified because the VOR instrumentation and a DME unit will be provided with proper computer outputs. Among the new instruments to be offered with the lightweight electronics is a combination RMI-Distance Indicator and a new rho/theta "waypoint" selector. The waypoint selector will be a control device for setting-in coordinates for off-set course computa-

· Equipments that will make their first appearance during 1956 in the Collins "lightweight" line are:

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• 51X-2 VHF communication receiver, 108.0 to 135.96 mc, crystal-controlled with 50kc channel spacing. Receiver with integral power supply in short 3/8 ATR case. Weight, 10 pounds.

• 17L-8 VHF transmitter for standby service, 3 watts output, 22 crystalcontrolled channels within the band 118.0 to 127.0 mc. Complete with modulator and power supply in a short 3/8 ATR case. Weight, 14 pounds.

• 51R-4 VOR-LOC instrumentation for use with 51X-2 communication receiver. A short ATR case provides VOR-LOC simple or full instrumentation, including RMI servo and integral power supply. Weight, 12 pounds. • 17L-7 VHF transmitter, 25-watt

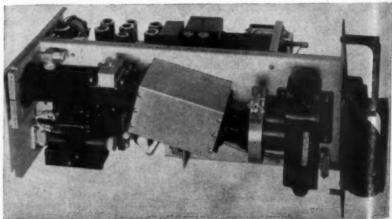
output, 118.0 to 135.96 mc, crystal controlled with 50kc channel spacing. Complete with modulator and power supply in a short % ATR case. Weight 14 pounds.

• 51V-3 glide slope receiver, 20 crystal-controlled channels, complete with power supply in short ¼ATR case. Weight, 7 pounds.

• 51Z-2 marker beacon receiver, 75

mc, three light instrumentation complete with power supply in short 1/4 ATR case. Weight, 6.5 pounds. A single light version will be available for further weight

51Y-1 automatic direction finder



Weather-mapping radar receiver-transmitter showing the new Load Isolator enclosed in the small central box. Isolator prevents the effects of slight line mistuning from reducing the life expectancy of the expensive magnetron tube used.

receiver, electrical remote tuning, 90-1800 kc range in continuous tuning, ½ATR. Weight, 15 pounds. Uses a 6pound flush-mounted ferrite loop.

• 860D-1 distance measuring equipment, with separate power supply and synchro output unit. Basic DME weight,

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• 341B-1 DME auxiliary unit including NC-102 Navigation Computer. of rho/theta type for use with VOR and DME. DME, power supply and synchro output function, short 1/2 ATR case. Weight, 17 pounds.

• 621A ATC transponder, 1/2 ATR case. Weight, 23 pounds.

• WP-101 weather radar system with printed wiring, magnetic amplifiers, 40 tubes for single indicator system, Load Isolator (Magnetron protec-

tor). Weight, 131.3 pounds.
• FD-105 flight director system, transistorized version of Collins Integrated Flight System, short 1/4 ATR. Weight, 8 pounds. Furnished with vertical gyro, course indicator and approach horizon. For use as flight director or part of automatic pilot system.

 MC-102 gyro-stabilized magnetic compass, using 332E-2 directional Gyro with integral amplifier and 323A-1 Flux Detector. Weight, directional gyro, 8 pounds. Flux detector 1.5 pounds.

### **Circuit Simplification**

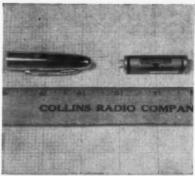
 Typical of circuit simplification achieved in the new line is the intermediate frequency amplifier circuitry in the 51X-2 VHF communication receiver that will weigh 10 pounds. The previous model 51X-1 weighed 29.3 pounds. The steep-sided bandpass characteristic needed for 50kc channel spacing is obtained by use of a new Collins component development. This is a mechanical filter smaller than the cap of a fountain pen.

According to Collins, the filter's use with three broadband amplifier stages gives performance superior to that of a conventional IF amplifier with five vacuum tubes in 10 tuned circuits with associated resistor and capacitor components. There is improvement, too, on the maintenance side. The need for IF

alignment has vanished.

Pioneering in the application of magnetic amplifiers to civil equipment, Collins last year offered an automatic pilot without vacuum tubes and operating entirely with mag-amps and transistors. The new lightweight Collins DF-201 automatic direction finder uses eight vacuum tubes and thirteen tran-

Athough mag-amps are inherently heavy because of the large amount of iron laminations they contain, Collins feels their greater power energy economy and lowered standby power drain



New mineture mechanical filter that replaces a conventional intermediate frequency amplifier having five vacuum tubes and ten tuned circuits with associated resistor and capacitor components. Filter is used with three broad-band stages to give superior results, accord-ing to Collins.

compensates to reduce weight in other parts of the system. One major advantage is their lack of depreciation through use. Evaluation of records, for example, on board the captured German cruiser "Prinz Eugen" after World War II showed not one of the mag-amps in the gun fire control equipment had required service in 10 years of operation.

Reliability does not come easily. Collins believes that as components are reduced in size the chances increase that reliability will suffer. It regards performance records of airborne equipment now in service of vital importance to its designs and uses the data to assist in component selection for new equipment designs. With reduction in size and increase in equipment density, heat per unit volume generally increases.

Collins engineers have made quick use of reduced-heat generating devices such as transistors and magnetic amplifiers to reduce the potential hazard of failures caused by high temperatures. Data collected by Collins shows that a 10-vacuum-tube equipment operating at 75°C ambient temperature has a predicted mean life of 1,000 hours. In contrast, a 40-tube equipment operating at 85°C has a predicted mean life of 250 hours.

Power reduction is an important aim at Collins. The DF-201 automatic direction finder uses only 28 volt-amperes compared to 90 volt-amperes for presently used equipment. Such reductions manifest themselves in reduced cabling wire size, smaller inverters and reduced generator requirements. This might result in a better generator safety margin during single engine operation. The new lightweight line will operate from ac or dc modular supplies. For custom installation, where a central power supply is wanted, the power supply modules may be removed.

· A primary rule of the General Module Standards is that "access to the bottom of an installed module for

mechanical or electrical adjustment should not be required." With the 1/4 and % ATR module support frames and using relatively open modules, access to the majority of modules is available without module removal. Adjustment of trimmer condensers, etc. is made from the top (the surface opposite the mounting surface). Many modules have key circuit testpoints, such as input and output. This simplifies circuit tracing. Many cased units have system test points on the front panels. In fleet operations, Collins recommends module replacement for rapid servicing. Malfunctioning modules would then be serviced at a later time.

Collins believes that weight reduction in its new lightweight equipment for jet transports may quickly pay for the equipment through increased payload. They also, believe the sizes and weights will permit a full complement of navigation and communication facilities for Instrument Flight Rule operation of light twin business aircraft without seriously reducing the range and payload of such aircraft.

### **General Electric Builds Jet Computation Center**

General Electric Co's Aircraft Gas Turbine Development Department will soon be using the latest giant computers for high-speed calculations in jet engine design work.

Two IBM Type 704 computers will be installed in a specially constructed building at GE's jet engine plant near Cincinnati. For best operating conditions for the computers, the 27,000sq. ft. building will be equipped with high-powered air-conditioning equipment to maintain close limits on temperature and humidity. Electrostatic filtering will be used to provide dust-

Annual rental fees for the 704's will be about \$1 million a year.

### **Electronics Sales Near** \$1 Billion in L. A. Area

The Metropolitan Los Angeles area electronics industry is well on its way to a billion-dollar factory billing by 1956, according to the latest Los Angeles Chamber of Commerce Report and Directory which shows an annual billing of \$916,680,000.

H. Leslie Hoffman, chairman of the Chamber's Electronics Committee, said the latest survey updates the initial report on the electronics industry which was the first of its kind for any major metropolitan area. The report showed a total of 436 firms in the area.

## New Products and Processes

### HIGH TEMPERATURE LOCKNUTS

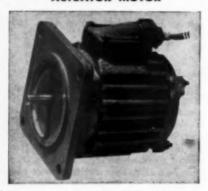
Elastic Stop Nut Corp. of America has developed two new lines of locknuts, chiefly for aircraft applications. One series uses A286, a stainless steel alloy, said to have improved tensile strength and to permit greater freedom in jet engine and aircraft fastening design.

A286 has a short-time tensile strength of 105,000 psi at 1,200°F as compared with 92,000 psi of Type 347 stainless.

Another line of lightweight, stainless steel anchor and gang channel locknuts is designed for use in temperatures up to 800°F and for applications where non-magnetic requirements exist.

Circle No. 151 on Reader Service Card.

### ACTUATOR MOTOR



U. S. Electrical Motors Inc. is producing an aircraft actuator motor with an extremely high starting torque of 22 in.-lbs.

Designated Type SESVA, the motor weighs only 5 lbs., operates on 3-phase, 400-cycle, 200-volt alternating current, up to altitudes of 50,000 ft. It delivers 2.2 hp intermittently at 8,400 rpm. Duty cycle is on 15 seconds, off 3 minutes, on 15 sec., off 15 min., repeated continuously.

Totally enclosed and explosionproof, according to the maker, the motor will operate under severe environmental conditions.

Circle No. 152 on Reader Service Card.

### AIR PUMP

Lear-Romec Division, Lear, Inc. has introduced a two-stage, piston-type air pump, designated Model RR-10900-B, rated for 1,000 hours continuous service and 300 hours continuous operation in the atmosphere at 60,000 ft.

Rated capacity of the pump is 575 cipm (0.0025 lb. per min.) free air delivery at 32 in. Hg. absolute inlet pressure. Displacement of first stage pump is 2.165 cu. in. per stroke and the

second stage pump 0.685 cu. in. per stroke. Crankshaft operates at 2,700 rpm. Circle No. 156 on Rooder Service Cord.

### HEATING ELEMENT



Film-type heating elements made by Therm-O-Lab Corp. are used in an electrical compartment heater produced by Universal Metal Products Inc.

The heater for the Boeing B-47 shown here uses 1,500 watts and has a heat transfer area of 450 sq. in. With air intake at 60°F, outlet air temperature is 200°F at 6 lbs, per min.

Therm-O-Lab heating elements are also used for windshield de-icing.

Circle No. 153 on Reader Service Card.

### DYNAMIC BALANCER

Micro Balancing, Inc. has developed an electronic dynamic balancer that will handle any rotating body from 4 oz. to 100 lbs., yet is said to be very simple to operate.

Designated the Model SU-6, the unit will balance fans, armatures, blowers, pulleys, crankshafts, drums, propellers, impellers and any other rotating body up to a maximum diameter of 20 in.

Circle No. 174 on Reader Service Card.

### PRESSURE SWITCH



General Controls Co. is making an AL-58D series pressure switch that serves as a pressure limit control for the operation of pumps, warning lights and other aircraft system devices.

An extremely sensitive, piston-type

unit, the switch reacts to pressures ranging from 25 to 10,000 psi, with a differencial of approximately 10%. All units in the series are supplied with specially developed seals for aircraft use, including systems handling highly corrosive fluids. A totally enclosed model is designed specifically for explosion-proof applications.

Circle No. 150 on Reader Service Card.

### VACUUM TUBE VOLTMETER

Radio Corporation of America has developed a new vacuum tube voltmeter, the Model WV-98A Senior VoltOhmyst, that features a large, full-vision meter face 6½ in. wide. Another feature is a single-unit ac/deohms probe with a built-in switch for selection of dc, ac or resistance functions.

Accuracy on ac and de voltage scale is ±3 percent of tull-scale values. DC voltages from 0.02 to 1,500 volts are read on two scales in seven overlapping "3-to-1" ranges. With a high-voltage accuracy probe, the voltage range may be increased to 50,000 volts. The unit weighs 6 lbs. and measures 7½ in. high, 5¾ in. wide, and 4½ in. deep.

Circle No. 154 on Reader Service Card.

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### PNP TRANSISTOR



Raytheon Mfg. Co. is producing a new PNP fused junction Type 2N138 germanium transistor for class B output applications. The 2N138 is sold only in pairs matched for optimum output and minimum distortion.

Average power output is about 50 mw with a power gain of 30 db when using a 4.5 volt supply. Physical dimensions are identical with those of the 2N130 series of miniature transistors.

Circle No. 160 on Reader Service Card.

### PANEL METERS

New 1½-inch VU and DB panel instruments designed to conform to MIL-M-10304 and MIL-M 3823 are offered by DeJur-Amsco Corp. The meters are available in either square or round housings.

The meters were specifically designed to meet size and weight reduction needs for aircraft and other uses where equipment is subjected to shock vibration or temperature extremes. The units have watertight seals at both terminal studs and the mounting flanges.

Various ranges, front or rear panel mounting, internal or external locknut

### **NEW PRODUCTS**

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zero adjuster and rear illumination are available.

Circle No. 168 on Reader Service Card.

#### POWER SUPPLY



A new multi-purpose power supply, Model 711A, is offered by Hewlett-Packard Co. The supply has a voltage range of 0 to 500, no-load to full-load regulation of better than ±0.25 percent or 0.5 volts. Ripple is less than 1 millivolt.

Separate current and voltage meters are provided together with pushbutton range switching for measurement of small voltages and currents. Either positive or negative de terminals may be grounded. Weight is 18 pounds. Circle No. 157 on Reader Service Card.

### CRUISE CONTROL AID



A flight angle computing system with no moving parts or vacuum tubes has been announced by the Airborne System Division of G. M. Giannini & Co., Inc. A differential pressure pickup senses attack angles and the data actuates pressure transducers. Outputs of these are combined in a computer network to give angle of attack. Accuracy is said to be as high as ± 0.1 degree over a range of ± 20 degrees It speeds up to Mach 2. By adding



Piasecki's YH-16A Turbo-Transporter

# ONLY THE BEGINNING IN THE LOGISTICS REVOLUTION

The new Piasecki YH-16A is the world's largest turbine-powered transport helicopter, capable of the greatest ton-mile delivery in rotary wing aviation. Yet it is only the forerunner of the ultimate in military troop and cargo helicopters. It is an aeronautical fact-finder that is enabling Piasecki engineers to proceed to the final step-the YH-16B, a far more powerful turbine-powered helicopter with substantially greater capacity and speed. In addition to its internal troop and cargo carrying capability, the YH-16B can haul heavy tactical equipment externally as a flying

These engineering steps are leading to a logistics revolution—these helicopters will deliver more men and more material-in force-to tight spots where and when they are needed. Another example of where Piasecki is picked for the toughest jobs.

ENGINEERS NEEDED FOR: DESIGN . AERODYNAMICS TESTING . STRESS ANALYSIS . AIRFRAMES

> Send resume to John Tannone, Jr., Employment Representative

> > HELICOPTER CORP.

MORTON, PENNSYLVANIA

Circle No. 8 on Reader Service Card.

YH-16B

### **NEW PRODUCTS**

a second computer indication of yaw angle can be obtained.

Circle No. 158 on Reader Service Card.

### CAPACITORS FOR AUTOMATION

One-ended solid dielectric capacitors designed for printed wiring board assemblies have been announced by Sprague Electric Co. Two short, straight leads are held with accurate spacing between them, and have an index key molded in the housing to facilitate automatic machine insertion. Three standoff feet hold the part above a printed wiring board to avoid dust traps and moisture accumulation. The new type

89P capacitors are sealed in a non-flammable plastic.

Circle No. 161 on Reader Service Card.

### **COIL BOBBINS**

Precision Paper Tube Co. is producing coil bobbins with any number of lug terminals desired, a feature that adapts the bobbins for use with printed circuits.

According to the manufacturer, the attached-lug feature represents an important advance, since attaching terminals heretofore has been both costly and extremely difficult.

The bobbins are available in any size, with round, square or rectangular core, and flanges of all shapes.

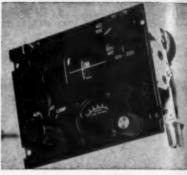
Circle No. 162 on Reader Service Card.





Circle No. 9 on Reader Service Card.

### ADF CONTROL HEAD



A new Type 170 ADF control head that requires only a 3½-by-3½-in. panel area has been developed by Electronics Equipment Engineering Inc. The company is also making a Type 1170 ADF control panel incorporating the Type 170 AFD control head in a Standard 5¾-by-4½-in. RTCA configuration.

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The 1170 panel can be provided with either the 170 or 170-190 head and completely wired to electrical disconnect to meet customer requirements.

Circle No. 155 on Reader Service Card.

### **ELAPSED-TIME INDICATOR**



An elapsed-time meter with a synchronous motor drive, weighing less than 6 oz., is offered by the Haydon Manufacturing Co., Inc., a subsidiary of General Time Corp.

Two models are available, one indicating hours in tenths to 9,999.9, the other minutes in 1/10-minutes to 9.999.9 (166.6 hours). They operate on 155-volt, 400-cycle current and can be mounted either behind or in front of the mounting panel.

Circle No. 163 on Reader Service Card.

### CATHODE RAY INDICATOR

Combined and matched servoscope and cathode ray indicator combinations may now be obtained from the manufacturer Servo Corp. of America.

The servoscope-cathode ray indicator measures gain and phase shifts of ac carrier and dc servo systems. Four models offer frequency ranges from 0.001 to 60 cps. The 5-inch indicator tube is a long persistance screen cathode ray tube. The sweep signal, phaseable with respect to generated signals, is provided by the Servoscope. Power requirement is 115 volts, 60 cycles.

Circle No. 164 on Reader Service Card.

AMERICAN AVIATION

### **NEW PRODUCTS**

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#### POWER TRANSISTOR



A new transistor of the grown junction, N-P-N type, has been announced by Texas Instruments Inc. The Type 970 silicon power transistor has a maximum dissipation of 3.5 watts at 100° C. Power dissipation is 8.75 watt maximum at 25° C. and power gain at 100° C. is guaranteed to be 28 decibels at one watt output for Class A operation, and 18 decibels at 2.5 watts, Class B.

The Type 970 weighs less than 34 ounce and is hermetically sealed in disc about 1/2-in. in diameter and 1/2-in. high. A mounting plate "heat sink" extends outward from the transistor to cover an area of about 3/4 x 1/4

Circle No. 159 on Reader Service Card.

#### MULTIMETER



A test instrument using vacuum tubes, Model 503 Digital Multitester, produced by Laboratory for Electronics, Inc., features digital display of readings. It measures de volts, ac volts, and ohms.

Three columns of electronic decade counters with neon light display act as indicators. Accuracy on the dc range is 0.15% of full scale for the range of 0.01 volts to 1,000 volts. On ac it is 1%. On ohms it is 0.2% of full scale for the range of 10 ohms to 10 megohms. The instrument measures 91/4 x 12 x 143/4 ins.

Circle No. 150 on Reader Service Card.

### TO THE FINE ENGINEERING MIND SEEKING THE CHALLENGING PROJECTS IN



### AERODYNAMICS

AERODYNAMIC ENGINEERS AND SCIENTISTS are urgently needed now at Convair in beautiful, sunny San Diego, California. Excellent career opportunities exist for junior and senior engineers for aerodynamics, performance and heat transfer analyses related to advanced projects in the supersonic Mach number range. A balanced background in experimental and theoretical aerodynamics is ideal for these positions. Analytical aerodynamic studies using analogue and digital computers are an integral part of this work. Challenging positions are also available for aerodynamicists experienced in research and development wind tunnel and firing range tests.

CONVAIR offers you an imaginative, explorative, energetic engineering department . . . truly the "engineer's" engineering department to challenge your mind, your skills, your abilities in solving the complex problems of vital, new, longrange programs. You will find salaries, facilities, engineering policies, educational opportunities and personal advantages excellent.

SMOG-FREE SAN DIEGO, lovely, sunny city on the coast of Southern California, offers you and your family a wonderful, new way of life . . . a way of life judged by most as the Nation's finest for climate, natural beauty and easy (indooroutdoor) living. Housing is plentiful and reasonable.

Generous travel allowances to engineers who are accepted. Write at once enclosing full resume to:

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### People

#### MANUFACTURING

Lt. Gen. Bryant L. Boatner (USAF Ret.), joins Eaton Manufacturing Co., as adviser in aircraft affairs.

A. R. Weckel, vp Sperry Gyroscope Co., named manager of Special Missile Systems Division.



TO THE PROPERTY OF

Wecke

Boatner

Al Mooney joins Lockheed Aircraft's Georgia Division at Marietta as design specialist in the special projects division.

Gordon J. Staub elected treasurer of Curtiss-Wright. Corp.

Norman J. Asher named administrator for research and preliminary design at Piasecki Helicopter Corp.

Dr. Alan M. Glover appointed gen. mgr. of semiconductor division, Radio Corp. of America.

William J. McGuckin will handle promotional activities for Librascope, Inc.

William L. Sparks promoted to western area sales mgr., aviation gas turbine division, Westinghouse Electric Corp.

Robert Tripp made executive asst. to resident mgr. of Areojet-General Corp.'s liquid rocket plant.

Dr. Hans E. Hellmann appointed director of research of Marvelco Electronics division, National Aircraft Corp. Joseph Herseck, Jr., pamed asst.

Joseph Horacek, Jr., named asst. sales mgr. of Turco Products, Inc.
David R. Anderson elected vice president-controller and George F. Mc-Donough vice president-industrial relations of Pratt & Whitney Co. Inc.

Donough vice president-industrial relations of Pratt & Whitney Co., Inc. J. A. Varney and T. A. Feeney elected vice presidents of Coleman Enginering Co., Inc.

A. Esperet appointed commercial executive vice president of Snecma.

Dr. H. Guyford Stever appointed associate dean of the School of Engineering, Massachusetts Institute of Technology.





Steve

N. Elliott Felt, Jr., named operations manager of Project Vanguard the world's first man-made earth satellite—by Martin Company.

RIAS, Inc., new subsidiary of Martin, announces the following officers: George M. Bunker, president; Welcome W. Bender, vice president; William L. Lucas, secretary-treasurer and resident agent; and Earl R. Uhlig, controller.

G. Rex Shields appointed sales mgr. of aviation sales for Axelson Mfg. Co., Div. of U. S. Industries, Inc.

Ed Ryder, formerly with AiResearch Aviation Service, made executive engineer in charge of preliminary design at Fairchild's new Engineering Development Center, St. Augustine, Fla.

Albert G. Noble (USN, ret.) elected

Albert G. Noble (USN, ret.) elected vice president of Vitro Corp. of America, A. P. Fontaine elected vp-engineering of Bendix Aviation Corp.

Everett M. Patterson appointed ex-

Everett M. Patterson appointed executive engineer of the Standard-Thomson Corporation.

Herbert Patchel, Jr., appointed asst. to the president of the Babb Company.

### Tipton, Newly Named ATA President, To Get More Powers Under By-laws

Stepped-up activity by the Air Transport Association on a number of fronts can be expected this year under newly-elected president Stuart G. Tipton.

Naming of Tipton, an 11-year veteran with ATA, marks the first time the directors have selected a president from within the organization. Tipton, well known and popular in the industry, will be given a free rein to run ATA. He succeeds Harold L. Pearson, who resigned after less than six months in office.

Tipton's authority is expected to be broader than that of any previous president. The directors authorized a revamping of the ATA by-laws to make certain that the president's powers are clearly defined and to spell out more clearly, if necessary, that he is the chief executive officer with authority to hire, fire and generally direct all activities.

• Tipton told AMERICAN AVIATION that top priority will be given this year to obtaining a modernized airways traffic control system. This, he said, is "the industry's No. 1 problem."

A major increase in public relations activities, under vice president Willis Player, will be undertaken. The public relations budget for the first half of 1956 is \$240,000, a 179% boost over the \$86,000 of the last half of 1955. The increase will be used to tell the industry's story more widely, principally through mass distribution of materials—pamphlets, films, etc.

Concerning the non-scheduled carrier situation, which Tipton regards as serious, ATA "will be arguing strongly for a flat statement from Congress that this is a regulated industry."

• On the legislative front, ATA's principal efforts will be on the pending omnibus aviation bills parts of which will be supported and other sections opposed. Alse, federal gas tax increases proposed in connection with highway legislation will be watched and Congress will be urged to exempt airlines. On current moves to remove the Civil Aeronautics Administration from the Commerce Department, ATA as yet has "no position," Tipton said.

On the state front, with 17 legisla-



TIPTON

tures meeting, activity will be directed toward maintaining the airlines' "fairly reasonable taxation" level.

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To bolster ATA's legislative effort, establishment of two new vice presidencies has been authorized. One vice president will head an enlarged public affairs department, providing increased activity at the state and local level. The other will deal with federal affairs. Neither job has been filled. Also vacant is the general counsel's job, vacated by Tipton. The latter appointment is made by the president.

ATA's program of making periodic industry economic reports to CAB will also be revived.

• More ATA effort will be placed on problems facing the U.S. in air transport negotiations with other nations. These problems will become "more serious" this year, Tipton believes.

Stanley Gewirtz was elected vice president and assistant to the ATA president. For the past two years he has served as executive assistant to the president.

Tipton joined ATA in 1944 as general counsel. In 1936-'38 he served in the legislative section of the general counsel's office of the Treasury Department, where he helped draft bills which became the Civil Aeronautics Act of 1938. From 1938 to 1940 he was an attorney for the Civil Aeronautics Authority, and during 1940-'44 was CAB's assistant general counsel.

### West Coast Talk . . . By Fred S. Hunter

• Boeing, Douglas running neck-and-neck in jet race.

Hunter

Military factor favors Boeing—as usual.

HERE we go traveling down the path of a new year and the jet transport race between Boeing and Douglas continues apace. The winner? Choose your own favorite. It's already evident both companies are going to come out all right, despite

the numerous industry predictions that the commercial jet transport market would have profits for no more than one manufacturer.

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Douglas is well past the 75-plane market generally accepted in the industry as the sales volume need Douglas used in pricing the DC-8. Arthur

E. Raymond, v.p. in charge of engineering, had quoted this number before Douglas reached its final decision to proceed with production on the DC-8.

Boeing is approaching the sales total where it is scheduled to make a volume price adjustment—65 planes. This means that if Boeing—like Douglas—isn't already in the black in its commercial venture, it is close to it.

Another side in this jet transport competition is the military. Here -as usual-the odds favor Boeing. Air Research and Development Command recently invited Boeing, Convair, Douglas and Lockheed to enter proposals for a long-range personnel (not cargo) jet transport for MATS. Boeing's new, bigger J75-powered 707 is reported a neat fit to the requirements. This does not necessarily mean that all is lost for the DC-8. The Air Force could order more than one plane. And there's always the Fleet Logistics Wing of the Navy. . .

One observer, sizing up the future transport situation, makes an interesting comment: "For years, flying the same type equipment, United Air Lines has had to play second fiddle to American Airlines on the blueribbon routes, like New York-Los Angeles, New York-Chicago, etc. Now, suppose TWA buys Boeing 707s—which is a good guess—and becomes the transcontinental carrier flying the same kind of jet equipment as American, leaving United as the only one of three flying Douglas DC-3s. What an opportunity that

could turn out to be for United."

Meanwhile, Lockheed remains undisturbed by all the commotion over jets, confident that 75% of the air traffic of the future is going to be turboprop and that it made the right

decision when it chose to produce the Model 188 Electra. We sort of wonder, though, if they don't let go with a sigh or two in the Lockheed financial section whenever they read about the prices being paid for 707s and DC-8s. Up to \$6,000,000 each, counting in the cost of spares. Looks as though the Elec-

tra, at a basic price of \$1,800,000, is strictly a bargain.

Just how important is speed? Convair, Canadair and Bristol would like to know. Their tri-company project is for a 200,000/210,000-pound transport powered by four Bristol BE-25 turboprops. It would be capable of a top payload of 50,000 pounds and could carry a full passenger load plus 15,000 pounds of cargo nonstop New York to Frankfort. An airplane like this could be fashioned into a real four-abreast de luxer with big lounge, galley and bar and show a good operating profit at today's standard fares. It's a 500 mph airplane and it could be operated on New York-Europe schedules within exactly one hour of the faster jets.

But what about that one hour? What would you buy? A turboprop with four-abreast seating and every imaginable frill of de luxe air travel, and arrive one hour later? Or a jet with five-abreast seating and fewer frills, and arrive one hour earlier? This, of course, pre-supposes the same fares. If IATA should establish turbojet-turboprop fare differentials, Convair-Canadair-Bristol would be in business—in the coach business.

Convair ICBM is popularly known as the Atlas and its Air Force designation is SM-65, but in Convair it is the Model 7. This company designation, incidentally, indicates how long Convair has been working on this project. The delta-wing F-102's factory designation is Model 8.



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Although there are more scheduled flights across the Atlantic each day than there are services on many of Washington's commuter bus routes, there is still much progress to be made.

Writing in the IATA Bulletin, John E. Slater, president of American Export Lines and formerly head of American Overseas Airlines, understates the situation when he observes: "It would not appear that there is any strong ground for self-satisfaction on the part of either the steamship or the airline companies when, by their combined efforts post-war, they have only succeeded in improving the situation in a prosperous pre-World War II period by approximately 20%."

The total amount of traffic crossing the sea in the ten years prior to World War I was regularly more than the total volume now being carried by sea and air combined. This is partly due to the great flow of immigrant traffic in the early years of this century. Moreover, in the 1920s the total traffic carried by sea alone exceeded 1,000,000 passengers a year, reaching a peak of over 1,250,000 in 1929. In 1954 the grand total of passengers moved by both sea and air by scheduled carriers was some 1,440,000.

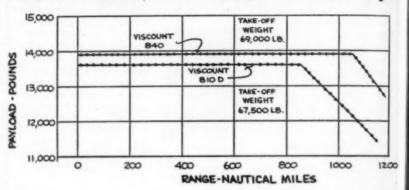
This background is of interest in view of the application by North American Airlines to operate coach services across the Atlantic at fares less than those of Iceland's cut-rate carrier Loftleidir and almost 50% of those charged by IATA members carriers. North American has submitted data to the Civil Aeronautics Board showing that by using 100-passenger DC-6Bs at an average load factor of 70% it could fly 169,000 transatlantic passengers a year at 4¢-per-mile fares and still come out with a profit of \$8,500. The IATA transatlantic tourist fare works out at 7.7¢ per mile on-season and 7.1¢ offseason.

North American wants to charge \$280 round-trip New York-London against the present IATA off-season tourist-class fare of \$482. By comparison the lowest round-trip sea fare is about \$340 which, of course, includes food for the minimum of ten days that are required for the double crossing but not tips and the numerous incidental items of expenditure that are unavoidable on a steamship.

The decision of Airwork Ltd. to suspend its scheduled all-cargo operation across the Atlantic shows that all is not well in the freight field. Despite the recent changes in the structure of IATA transatlantic cargo rates (AMERICAN AVIATION, August 1) freight traffic continues to lag behind passenger business. Education seems to be the answer. The public takes as a matter of course the

sending of a letter abroad by air mail, even though the cost is considerably greater than by sea mail, but it has not yet been educated to regard the shipment of freight in the same light.

### CAL's Viscount to Cruise at 400 mph



Latest version of the Vickers Viscount series, the Viscount 810D/840, ordered by Continental Air Lines, will be a 400-mph aircraft. CAL's 12 planes will be delivered as Model 810Ds with Rolls-Royce Dart RDa7/1 engines of 2,100 ehp, but within a year 2,500-ehp RDa8s will be substituted. With the new engines, which will increase the ruise speed from 363 mph to 400 mph, the aircraft will be known as the Model 840.

A special feature of New Viscount is its take-off and climb performance at high-altitude/high-temperature airfields. This results from the RDa7/1's reserve of power. The engine is basically capable of giving over 2,100 ehp but is derated for take-off to 1,800 shp plus jet thrust. This reserve of power enables the take-off performance to be maintained at airfields such as Denver, which is over 5,000 ft. up and has temperatures

of up to 90°F. The RDa8 will be similarly derated and thus the use of water-methanol on this engine can be virtually eliminated.

It is proposed to certificate the Viscount 810D initially at 67,500 lbs. Maximum take-off weight with a 60,000-lb. landing weight. The Model 840 will have a maximum take-off weight of 69,000 lbs. The first flight trials in connection with the 810D/840 program are due to start this month with the installation of a special powerful version of the RDa6 Dart in the prototype Viscount 700 to produce speeds of 400 mph. The RDa7 will be available in production Viscounts in the late summer of 1957 and this engine will be used initially by British European Airways. CAL's 810D/840 Viscounts will be delivered between March and September 1958.

### Transport Briefs

Compania Cubana de Aviacion has bought the three Vickers Viscounts ordered by British independent Airwork for delivery in the first half of 1956; it will use them for services from Havana to Miami and points in the Caribbean area. . . Compania Mexicana de Aviacion has purchased three Fairchild C-82s for carrying food products from southeast Mexico to Mexico City . . . Trabajos Aereos y Enlaces is a new Spanish local-service airline formed in Bilbao to operate to such points as Vitoria, Logrono and Biarrits; it is said to be interested in buying five Scottish Aviation Twin Pioneers.

Aviation Twin Pioneers.

Pacific Western Airlines, Canada's third largest air carrier, has applied

to the Air Transport Board for permission to operate a scheduled trans-Canada intercity coach service using Convair equipment . . .

#### **Manufacturing Briefs**

Bristol has moved helicopter production from its main Filton plant to the nearby factory at Weston-Super-Mare. . Short Bros. & Harland has skinned its first Britannia fuselage and removed its first Britannia wing from the jig . . . Morane-Saulnier has received French government orders for 80 Model 760 Paris jet communications aircraft—50 for the air force and 30 for the navy; company is working of an eight-passenger transport powered by two Turbomeca Gabizos.

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### Beech Aircraft Sales Goal for 1956 Is \$32 Million

By LOIS C. PHILMUS

Beech Aircraft Corp. is entering 1956 with \$11,500,000 in firm orders on its three executive aircraft models, a third of the way toward its announced goal of \$32 million in commercial sales. The all-time record high quota was announced by Mrs. O. A. Beech, president, after she revealed to a recent meeting of distributors that commercial sales in fiscal 1955 had exceeded by 40% the 1954 record, topping \$27,400,000.

Features of the 1956 line are:

- Model G35 Bonanza, singleengine, four-placer, is powered by the new version of the 225 hp E-225-8 Continental engine, which previously had been optional for the Bonanza. The larger engine boosts the cruising speed of the fast, clean plane to 190 mph at 75% power or 184 mph at 65% power. In addition, the structures have been reinforced, the heating system revised to supply up to 20% more cabin heat and more fresh air is provided with new abin ventilation. An instrument panel afety guard has been provided in a soft, impact-absorbing shield across the top edge of the instrument panel. Standard G35 has been priced at \$21,990 FAF Wichita.
- Beechcraft Twin-Bonanza Model D50 boasts more powerful engines, greater speed and range and higher useful load than the Model C50. Twin Lycoming high-compression engines, rated at 295 hp, with Hartzell three-blade propellers, create a cruise speed of 203 mph and top speed of 214 mph. Useful load has been upped to 2,319 and range to 1,650 miles. New baggage compartments increase allowable luggage weight to 450 lbs.

The small Twin comes in either five- or six-place configuration. Individual seats are provided for pilot and copilot separated by an aisle in the five-place version. The six-place arrangement features simple removal of the back of the co-pilot's seat for roominess and flexibility. Foldaway card tables are added attractions for the convenience of rear-seated passengers.

Cost of the standard Model D50 is scheduled at \$77,000. Beech officials have announced that a 1956 version of the Model C50 will be continued in production, minus the new propellers and engines, at a price of \$75,000.

• Beechcraft Super 18 eight-place twin-engine business transport has been fitted out with more than 30 new design and comfort improvements. Redesigned interior offers choice of seating and pro-



Beechcraft Super 18, eight-place executive transport, sells for \$98,975.



D50 Twin-Bonanza, six-place job, cruises at 203 mph.



Beechcraft Bonanza, four-place monoplane, is priced at \$21,990.

vides for removal of seats for cargo carrying. Partial list of changes include: redesigned cabin door with reinforced steps, mountings and new ring handle; new cockpit heater control; redesigned generator system which permits generators to be turned on regardless of the seating arrangement, and redesigned hydraulic brake line system for easier wheel maintenance.

Super 18 performance is reported at 215 mph cruise; 234 mph top speed; range of 1,460 miles; and useful load of 3,250 lbs. Priced at \$98,975, the transport is powered by Pratt & Whitney R-985 450 hp engines with hydramatic propellers.

Unique feature of Beech's distributor meeting was the international flavor. This year marked the first time that the sales meeting included representatives from Beech agencies abroad. Included among the 200 distributors in attendance were Beechcraft distributors from Canada, Chile, Colombia, India, Mexico, Puerto Rico and Switzerland.

The company reported net income after taxes of \$3,586,510 on sales of \$77,075,541 for the fiscal 1955 period ending September 30. In fiscal 1954 income was \$3,386,089 on sales of \$78,033,435. Present backlog has been announced at over \$71 million.

### General Electric's 'Laboratories in the Sky'

Test flying of new aircraft engines and equipment is vital before the items can be put into production and operational use. Every major engine and components producer has a fleet of "laboratories in the sky" where the new equipment is tested.

General Electric Co.'s Flight Test Center at Schenectady is no exception. Using mostly aircraft released on bailment by the Navy and Air Force, the test center has been operative since 1946 at Schenectady, although the firm's flight test activities go back to 1942 at LaGuardia Airport, New York. A branch has also been established at the USAF's Flight Test Center, Edwards AFB, Calif.

The Schenectady flight testing operation is part of GE's Aeronautic and Ordnance Systems Division but works closely with either company defense activities, including the Electronics Division at Syracuse and the Aircraft Gas Turbine Division facilities at Evendale, Ohio, and Lynn, Mass.

Headed by C. G. Talbot, the GE Flight Test Center requires the services of more than 140 engineers, technicians and test pilots in one hangar and two shops.

Among the 30 "flying laboratories" which have been assigned to GE for engine and equipment testing since the center started have been Boeing B-17s, B-29s and B-50s, Convair B-24s, Lockheed F-94s, Republic F-84s, North American B-25s, B-45s and F-86s, and Douglas F3Ds.



Republic RF-84F with "pointed nose" is one of several aircraft on loan to G. E. from Air Force.



North American B45 bomber tests company's newest jet engines with special instruments and retractable test-bed in bomb bay.



B-29, carrying J73 turbojet, makes test flight.



G. E. test planes lined up on ramp outside flight test center at Schenectady County Airport.

### TRANSPORT TRENDS Washington, D. C., Jan. 2, 1956

### DESPITE OUTWARD EMPHASIS BY THE ADMINISTRATION and

Civil Aeronautics Board on raising the Board's prestige, the year-end probably marked a new low for "un-judicial" activity. Leaks from inside the Board itself were numerous, and pressures exerted on CAB members were of staggering proportions.

Stories of vote-swapping by Members were intermingled with personal threats to Members from elements of the aviation industry—and Congress. A year that at times bordered on the rim of proud accomplishment deteriorated in the last two months apparently under the strain of a too-active undertaking.

The pattern thus set will carry well into the new year and all evidence points to CAB becoming an election-year political football due for considerable kicking around.

### THERE WAS A STRONG POSSIBILITY LAST WEEK that CAB,

either voluntarily or through enforced court action, might postpone the January 1 effective date of its liberal concessions to nonscheduled airlines.

But there were no indications the agency would reverse its 3-2 vote in the controversial case. A postponement beyond January I would reduce the voting majority of the Board to two, since Josh Lee's term ended December 31. New Member G. Joseph Minetti, already a target of some Democratic Congressmen, probably would not take part in any immediate actions in the case.

Meanwhile, fears in some Administration circles that reversal of the decision might be taken as an anti-small business move were lessened by the plea for protection by the nation's local service airline industry, which last year was recognized in Congress as the legitimate small business segment of the industry.

### EXPECTED BILLION-DOLLAR PARTICIPATION by insurance firms in airline jet financing programs has passed the \$300-

firms in airline jet financing programs has passed the \$300million mark in the two-month period since Eastern announced its \$90-million program with Equitable Life Assurance Society.

Largest yet to be undertaken is a \$150-million refinancing by United Air Lines, of which \$120 million will be supplied by three insurance firms and \$30 million via a new bank credit agreement. In the UAL deal, 4% debentures will be sold to Metropolitan Life Insurance Co., The Prudential Insurance Co. of America and The Mutual Life Insurance Co. of New York for probable 1981 retirement.

This marks the second airline program involving Metropolitan. Earlier, that firm entered into a \$75-million transaction with American under which funds would be made available from 1956 through 1959 against 4% notes payable in 1996.

Eastern's deal with Equitable for \$90 million bears an interest rate of 33\(^4\%\) from date of borrowing. Although basically a 20-year loan, a special feature provides that no repayment on principal be made for the first 10 years of the loan. Beginning in 1966, payment is due in semi-annual installments through 1975.

### TRANSPORT AVIATION

### Local Service Lines Geared for Record Year

Permanent certification by CAB of 13 carriers foreshadows period of expansion despite threat of competition from nonskeds.

By WILLIAM V. HENZEY

VIATION'S truly small business A element, the local service airline industry, passed a significant milestone last month-permanent certificates for all. But the occasion, lacking any note of complacency, was marked by these developments which signalled a period of unparalelled activity ahead:

• Frontier Airlines, heaviest subsidized of the local lines, petitioned CAB to start an investigation to (a) strengthen its route system, (b) keep it free in the interim from proposed additional trunk competition, and (c) generally pave the way for a self-sufficient system.

• West Coast Airlines announced purchase of an option for six Fokker F-27 turbo-prop transports in the first move by a local carrier out of the pistonengined airplane field.

 Conference of Local Service Airlines, through their counsel, John F. Floberg, jumped into the non-scheduled



FLOBERG

airline fracas with both feet, claimed locals were "misled" by CAB rulings in the past, and they, not the nonskeds, should be first recipients of more liberal operating authority. The Conference also met with CAB members and top staff

officials urging a "more realistic" approach by the Board to local service mail rate problems.

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JANUAR

### **Locals Made Comeback**

Individually, these developments are forerunners of future events. Collectively, however, they bespeak the confidence borne in the local lines during the past two years, when, faced with after a threat of extinction, they rebounded to permanent status with the greatest show of Congressional support ever mustered by a segment of aviation.

Perhaps significantly, the permanency, fight was won over the opposition of the Civil Aeronautics Board and a Commerce Department-dominated Air Coordinating Committee.

• To CAB's credit, however, it must be pointed out that once Congress dictated a permanent role for the local industry, CAB broke all records in expediting the necessary certificate cases.

Last month, December 12 to be



exact, the last of 14 permanent certificates was issued by the Board. This concluded a procedure which started in mid-July shortly after Congress passed the permanency legislation.

Actually, there are 13 companies operating strictly as local service airlines. The 14th permanent certificate handed out by CAB was for the former Pioneer Airlines' Routes now owned and operated by Continental Air Lines, a trunk.

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This history of these carriers dates back to July 11, 1944, when CAB, as a policy matter, established a classification of what were originally known as feeder air carriers. Subsequent route proceedings resulted in temporary certification of small individual feeder airlines throughout the country.

Nothing came easy to those who invested in the novel experiment and after years of short-haul, profit-less operations, they were finally recognized by Congress in 1954 as meriting more than the day-to-day existence which temporary certification, tight route restrictions, and a wavering Administration policy, had cast upon them.

Congress ran out of time in 1954 or permanency would have been a year earlier. However, little time was lost in 1955 and the necessary legislation was passed.

#### Thirteen Survivors

Thirteen companies survived to benefit by the vote of confidence. They, plus the old Pioneer operations now conducted by Continental provide service to 390 cities in 42 states over more than 35,000 certificated route miles. They have about 175 twin-engined aircraft and carry about 3,000,000 passengers annually.

They enjoy a unique distinction. They constitute a segment of aviation requiring over \$20 million a year in federal subsidies, but no one—save the carriers themselves—dares criticize it. One major reason is that local air service is one public benefit each Congressman can go home each year and brag about to his constituents.

Or perhaps it might be said that it is one public benefit many Congressmen are afraid to go home without supporting.

At any rate, with such support and their record of accomplishment over the years, the local lines are in a position to take the offensive in the new drive to self-sufficiency.

The Frontier move aimed at strengthening its routes was a quick follow-up to CAB's strengthening of regional trunks in recent route cases. Said Frontier: "CAB's policy of assistance logically applies with greater force to subsidized carriers seeking self-sufficiency than to subsidy-free carriers seeking merely to become bigger and more powerful."

\*According to Frontier's arguments, CAB has "the means and the power to authorize changes in Frontier's certificate which will minimize and ultimately eliminate its subsidy" which averages \$2.5 million a year.

While CAB is weighing such strengthening, however, Frontier insisted that trunkline route applications for service to eight segments in its area should be deferred. These applications, if granted, the line charged, "would forever block the opportunity for Frontier to become subsidy free."

West Coast's equipment move, meanwhile, is the most advanced aircraft step taken by a local carrier in the industry's long search to "find a replacement for the Douglas DC-3." Several carriers, of course, have purchased and are operating more modern piston-engined equipment such as Martin 2-0-2s and Convair 240s, but none previously were committed to turbo-props.

As indicated elsewhere in this issue, an equipment transition program has thus gotten a start in the local industry.

#### Threat to Survival?

• But while the small certificated carriers were gearing for the future, on the one hand, they viewed CAB's recent liberal award to non-scheduled airlines as a "serious economic threat" to survival.

Although the non-skid proceeding was in progress for four years, the local industry did not participate because, it argued, there were assurances in CAB orders that only "supplemental," and not "duplicating," services would be authorized. In this respect, the group charged, it was "misled and deceived" by the CAB pronouncements.

How are the locals affected by the

CAB decision? Floberg phrased it this way: "CAB's order permits nonskeds to hold out and conduct regularly scheduled flights between any and all points within the U. S., including those served by local lines, and to compete directly with petitioners without the same obligations to render complete service and without the restrictions under which locals operate.

"Every local carrier enjoys relatively profitable route segments and the Board deliberately keeps in mind, in designing route systems, rich segments as a balance against self-supporting operations. The predation by the irregular carriers, operating without scheduled restrictions, will gravely undermine the entire route structures and the economic basis thereof in the case of all local carriers."

• To hurt the locals and at the same time increase the subsidy bill, Floberg contends, it would not be necessary for the nonskeds to abuse the CAB-proposed limit of 10 flights per month for each non-sked between each pair of points. One non-sked, he points out, scheduling flights on heavy week-end days over a local's best segment could take the heart out of the local's main commercial revenue source.

Just as the addition of one passenger to each local flight means a reduction in subsidy, so the loss of passengers means an increase in Federal funds.

Thus, it appears the fight has just begun for the local service industry. More investigations of the type proposed by Frontier can be looked for. The new equipment drive will blossom under the spur of the West Coast contract. In short, the local service industry was just flexing its muscles in the fight for permanency. It will now put them to work to achieve self-sufficiency.

### Douglas DC-7C Makes First Flight



Flight testing of the Douglas DC-7C "Seven Seas" got under way at Santa Monica, Calif., last month. More than 100 of the newest Douglas overseas transports are on order with deliveries scheduled to start about mid-year.

VIATIO

### Foreign Planes Dominate DC-3 Replacement Field

By ANTHONY VANDYK

Large-scale adoption of the Dutchdesigned Fokker F-27 Friendship as the DC-3 replacement may result from the recent action of West Coast Airlines in purchasing an option on six of the high-wing turboprop transports.

The aircraft would be built in the U.S. by Fairchild Aircraft Division at Hagerstown, Md. That company is already making preliminary engineering preparations for license production as a result of satisfaction with the flight performance of the Friendship.

If West Coast Airlines picks up its option it will be the first U.S. local service airline to order a plane genuinely designed as a DC-3 replacement. There is good reason to believe that the Seattle-based carrier's option may touch off a round of orders for the Friendship and possibly for other aircraft in its class by the other 13 U.S. local service airlines and many other carriers all over the world.

• Fairchild says it could start deliveries of the Friendship in September 1957. Availability of the RDa6 Dart presents no problems, the company has been informed by Rolls-Royce. This is the engine that powers Capital Airlines' Viscount fleet.

The production Friendship will be three feet longer than the 73-ft. prototype that started its flight tests at Amsterdam last November 24. The Fairchild version will also have more tankage than the original design so as to make it suitable as a long-range executive aircraft. Seating capacity of the Friendship for local service airline use will be 40.

Only two other aircraft designed as DC-3 replacements are flying—Britain's Handley Page Herald and France's Hurel Dubois HD 32; both are pistonengine powered. Another foreign DC-3 replacement, the Aviation Traders Accountant, is approaching completion and is scheduled to fly in the early spring. All four aircraft have one thing in completion and incompletion and incompletion and incompletion are scheduled to fly in the early spring.



Contract by which West Coast Airlines bought an option on six Friendships was signed by President Nick Bez and (seated) R. James Pfeiffer, Fairchild's Director of Customer Relations.

mon—they accommodate about 40 passengers. In almost all other respects they differ radically.

• The Friendship is a high-wing aircraft powered by two Rolls-Royce Darts. The Accountant uses the same powerplant but has a low-wing configuration. The HD 32 has a high wing and is powered by two Wright C9s or P&W R-1830s. The Herald is also highwinged and piston engine-powered but

it has four engines—Alvis Leonides

Its high-aspect-ratio wing gives the HD 32 the greatest span—148 ft, 7½ in. This compares with the 95 ft. of both the Friendship and the Herald and the 82 ft. 6 in. of the Accountant. The HD 32 is also the longest of the four aircraft, with a fuselage length of 76 ft. 4 in., although in its stretched production version the Friendship's fuselage will be 76 ft. long. The figures for the Herald and Accountant are 70 ft. 3 in. and 60 ft. 6 in., respectively.

Despite its lower power, the HD 32 comes out on top in payload. With the 1,525-hp Wright engine it can carry 16,310 lbs. over a 620-mile sector. Economic cruising speed, however, is only 170 mph. Both the Friendship and the Accountant are about 110 mph faster but carry a lower payload—some 9,500 lbs. The Herald's cruise speed is 200 mph and its payload is 10,700 lbs.

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Manufacturers' performance figures are of course taken with a grain of salt by most operators. It is little use, however, for airlines to check on the past record of aircraft manufactured by Aviation Traders or Hurel Dubois, for neither company has ever had an airplane in commercial service. The British company, in fact, has never built a complete aircraft of its own although it has a good record in the field of component manufacture.

• The Handley Page company presents a different story. It has been building transport aircraft on and off for the past 35 years. Its Heracles model of the '30s was one of the most comfortable planes ever built. It was not fast or beautiful, but it could take



Fokker F-27 Friendship powered by two Dart turboprops cruises at 280 mph. It has been undergoing flight tests since November 24.



Handley Page Herald has been flying since late summer. It is the only four-engine DC-3 replacement flying. It uses the 870-hp Alvis Leonides Major.

12 passengers in and out of some of the smaller European airports in complete safety; moreover, it was one of the most reliable aircraft ever built.

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Since the war Handley Page has uilt only one commercial transport ther than the Herald—the Hermes which quite frankly was not particuarly successful. The Herald actually as built at the former Miles plant at Reading which Handley Page took over few years ago. Many of the men who worked on it were from the team that oduced the Marathon, a twin-engine odel not unlike a scaled-down Herald. Apart from the Herald, Handley Page building the Victor four-jet crescenting bomber for the RAF. One of e company's key personnel is Dr. G. V. Lachmann who is well-known or his work on slow-flying devices from slots to boundary layer control.

Like Handley Page, the Fokker company is one of Europe's best known increast manufacturers and has many cars of transport-building know-how. In the twenties and thirties the Dutch im's high-wing transports were standard equipment on a high proportion

of the world's airlines and many were built in the U.S.

In addition to manufacturing a whole range of its own designs, Fokker obtained the European sales rights for the Douglas DC-2 and DC-3 in the '30s. Thus, the license agreement it concluded with Fairchild in 1952 represented merely part of a continuing program of cooperation between Fokker and the U.S. aircraft industry.

#### **Darts Doing Well**

• In the powerplant field all but one of the DC-3 replacements mentioned above have engines that have good reputations in the U.S. The HD 32's Wright C9 (or the alternative P&W R1830) needs no recommendation to operators. The Dart, as used in the Friendship and the Accountant, is making a good name for itself in the Viscount.

Darts have logged some 75,000 hours in airline service and have proved exceptionally trouble-free. Rolls-Royce's after-sales service seems to be every bit as good as that offered by U.S. engine manufacturers.

• The only engine that has no commercial service record is the Herald's Alvis Leonides Major. The ability of this powerplant is therefore a question mark, as is the Alvis company's ability to provide effective service after sale. Nonetheless, it must be recorded that the smaller Leonides engine has an excellent record and that the many military buyers of Alvis powerplants seem to be highly satisfied with the performance of the British company's products.

At this writing Fokker/Fairchild has two customers for the Friendship— KLM and West Coast Airlines.

Four companies have made commitments to take the Herald—Queensland Airlines, Australian National Airways, Lloyd Aero Colombiano and Air Kruise. The status of Air France's option on the HD 32 is unclear but Hurel Dubois has production orders for military and survey versions. As yet Aviation Traders has received no orders for the Accountant, the only one of the four aircraft mentioned that has not yet flown.

### Eastern Buys G. M. Engines and Props

General Motors made it a clean sweep on all Lockheed Electras ordered to date recently as Eastern Air Lines announced a \$26-million procurement of engines and propellers built by its Allison and Aeroproducts Operations divisions respectively.

Earlier, Braniff Airways became the first carrier to announce choice of the same engine propeller combination simultaneously with its order for nine of the turboprop transports.

The present EAL-GM agreement

The present EAL-GM agreement involves 200 engines and propellers—160 to equip Eastern's 40 Electras, plus a 25% allocation for spares. However, provision is also made for production of an additional 150 assemblies for 30 other Electras Eastern has on option, which would bring the total value of orders over \$40 million.

EAL's option on the additional Electras reportedly will expire about September 1956.

In deciding on the GM equipment, EAL chairman Capt. E. V. Rickenbacker said the most important underlying factor was that the Allison/Aeroproducts combination places both engine and propeller under a single corporate ownership and management.

Rickenbacker added that the choice culminated a year-long study of all engines and propellers available here and abroad and takes into consideration some temporary competitive time advantages offered by British manufacturers.



Tunca's DC-3 replacement, the Hurel Dubois HD 32, has been undergoing development flying for some three years. Powerplant comprises two Wright C9s or P&W R1830s.

IATION

### Airlines Set New Records in 1955: Traffic Jumps 19%, Income Up 13.4%

New traffic and revenue records were set by the U.S. scheduled airlines in 1955, as they exceeded the most optimistic forecasts that had been made for them.

The airline gains were so substantial that they alone resulted in a 3% increase in total U.S. intercity common carrier traffic for the year. Railroads and buses continued to slump, but the airlines more than made up their losses. It marked the first time

since the Korean war that intercity traffic had shown an increase.

The industry (trunks, local service, international, territorial, helicopter, and Alaskan) registered a 19% gain in passenger traffic, a 20% increase in revenue ton-miles and exceeded 1954's revenue figure by 13.4%, according to Air Transport Association's year-end estimates.

Highlights of 1955 included:

• Placement of orders for 146 jet

transports and 156 turboprops at approximate cost of \$1.5 billion.

• It was the first billion-dollar year for the domestic trunks. Passenger revenue alone topped the billion mark (\$1,016,560,000) while total revenues reached \$1,133,556,000.

• Domestically, air coach traffic showed the larger increase, up 24%.

First-class gained 16.9%.

Subsidy dropped 42%, from \$66.2 million in 1954 to \$38.4 million last

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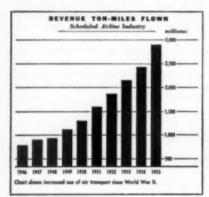
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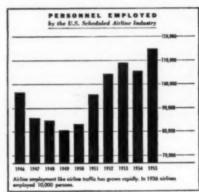
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• The entire industry's revenues increased from \$1.4 billion to \$1.6 billion. Passenger revenue totaled \$1,356,435,000, up 16.3% from \$1,166,554,000.

• Express and freight showed substantial gains. Industry express was up 25.5% from 41,175,000 ton-miles in 1954 to 51,680,000 last year. Freight jumped 19.7% from 236,623,000 to 283,292,000. Domestic trunks' freight totaled 176,175,000 ton-miles against 144,432,000 in 1954, up 22%. Their express increase was 25% (50.2 million against 40,165,000).

• Industry air mail showed a tonmile increase of 19.9% but air mail revenue was up only 6.6%. Domestic trunks' mail, however (even including 3¢ experimental mail) gained only 8.9%, and their mail revenue dropped





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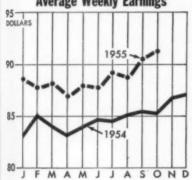
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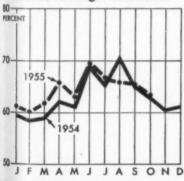




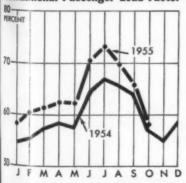
### Aircraft Production Employees Average Weekly Earnings



### **Domestic Passenger Load Factor**



### International Passenger Load Factor



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We hereby single out a few 1955 sales, promotion and service developments for special mention:

• Baggage: United Air Lines and American Airlines pushed plans to make life easier for the customer. UAL extended its self-claiming baggage system to many cities, concentrated at others on reducing bag delivery time through use of "commando" teams. AA pioneered system of allowing passengers to stow lags under seats of DC-6s and DC-7s.

• Sales promotion: Western Air Lines did an outstanding job with its "Californian" flights. The "champagne" service was started in 1954, but full impact was felt in 1955. Traffic has been loosted in the face of stiff competition.

• Equipment introduction: Capital Airlines, successfully introduced a foreign-built plane, the turboprop Viscount. Excellent advertising and promotion program.

• Interline work: Tom Dempsey, Continental Air Lines' interline and agency manager, scores high. His clever mailing pieces and gimmicks have made CAL's routes and services familiar to many employes of other carriers.

• No-shows: The "frustration award" for 1955 goes to the Air Traffic Conference, which batted .000 in three attempts to agree on a penalty for pasengers who make reservations and fail to show up.

We have proof of readership—the wrong kind of proof. On this page reantly, through a slip of the typewriter, me placed Slick Airways smack-dab in the middle of the helicopter business with a Pomona-Los Angeles route. Readers have called this to our atten-

tion. We therefore return Slick to the cargo field and wish Los Angeles Airways success with its Pomona operation.

Again we have been fortunate enough to win an award (for airline sales and promotion coverage) in TWA's annual aviation writing competition. Our thanks go to the folks who made the award possible by sending us information and taking the time to discuss story ideas with us. Keep the items coming.

### Sales, Traffic, Promotion

Civil Aeronautics Board is considering local airlines' request to extend for a year the advertising-for-transportation swap and to up the limit from \$25,000 to \$50,000. Favorable action is expected . . .

TWA's new "spectacular" at Broadway and 43rd, New York is a real attention-getter. Sign is 75 ft. high and 100 ft. long, topped by a Super-G Constellation (46 ft. long with a 48-ft. span). It features a constantly-changing diorams of views along TWA's domestic and international routes . . .

The mistake on American Airlines' 1956 calendar has been the subject of much good-natured conversation. November this year has five Thursdays. AA designated the last Thursday, instead of the fourth, as Thanksgiving. Company is distributing stickers correcting the error . . . Congratulations to Pan American World Airways on its revamped system to the Distribution of the last constant of the property of the property of the last constant of the property of the

Congratulations to Pan American World Airways on its revamped system timetable. Big print and simplified listings are great improvements. Destinations are in bold sans serif letters, well spaced out. Connecting non-PAA flights were taken out of PAA listings and put by themselves, as were flights of PAA affiliates. The simplification has increased the timetable from 40 to 60 pages . . . PAA ad in national publications has been stressing the theme than "no country in the world has requirements of airline operation more strict than those of the U.S. Government:" Further, that PAA meets the U.S. rules "with a generous margin to spare . . ."

Conference of Local Airlines has prepared an attractive folder entitled "Fly Local Airlines to Main Street, U.S.A." It's designed for seat pocket use. Includes lots of useful information, including route map and brief description of each local line . . . Three car rental companies have cooperated through the Air Traffic Conference in preparation of a joint folder (for seat pockets) advertising their services. Formerly, Hertz, Avis and National Car Rental each had a folder . . .

Delta Air Lines has set its ad budget at \$1.5 million to cover stepped-up program in connection with recently-awarded new routes. Two-color ads will appear in next few months in National Geographic, New Yorker, Newsweek, Time and U.S. News & World Report...

American Airlines is redecorating the cabins of some of its DC-6s. Side walls and ceiling are cloud gray; hatrack rails and arm rest sides, red; seat cushion and forward side of seat backs, balanced mixture of red, white and blue, with window and coatroom curtains to match; seat back aft side, underseat rugs and scuff plates, dark blue; aisle rug, dark blue with small red polka dots; lavatory doors, companionway panels, etc., copper color fabric; light and vent panels and lavatory hardware, copper lacquer . . .

R. C. Schumm, Allegheny Airlines' director of stations, sends to each station manager periodic summaries of comments submitted by passengers. Publication is called "Executive Mirror." Managers are required to hold meetings with station personnel on the contents. A good aid in improving passenger service.

Los Angeles Airways' direct mail piece urged people to give LAA helicopter rides for Christmas . . . North Central Airlines has completed conversion of all but three of its DC-3s from 21- to 25-passenger capacity. Carry-on luggage racks have also been added . . .

Sales officials of 38 member airlines of Air Traffic Conference were subjected to a 14-day teaser campaign by Western Air Lines, plugging "Californian" service. Each one received, without knowing why, a dozen Hawalian orchids, two champagne glasses followed by a bottle of champagne, two fresh crabs, two steaks, two Idaho potatoes, plus bottles of French perfume Mystery was cleared by a letter from Bert Lynn, WAL advertising and sales promotion director, and Art Hewitt, agency and interline director, inviting them to try a flight...

Swissair has introduced "Cinerama Holiday" tours which include many of the places shown in the movie. To promote the tours, the airline is running a special series of ads in cities where "Holiday" is playing. Also, 13 Cinerama theaters are inserting flyers describing the tours in their printed programs . . .

### **Braniff Orders Nine Electras**



Mid U.S. domestic airline to order Lockheed Electra turboprop is Braniff Airways. Cerrier ordered nine Electras of type shown above at cost of \$22 million with first deliveries starting in May 1959.



To keep 'em flying higher, farther, faster... American Aviation

1025 Vermont Ave., N.W., Washington 5, D. C.

LaGuardia Airport, N. Y.

Get into AMERICAN AVIATION! Want 'es

to use your product at NY's Idlewild Airpor

setting up now for \$60 million in new con

Yes, get into AMERICAN AVIATION 20

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139 North Clark St., Chicago 2, Ill.

9843 Wilshire Blvd., Beverly Hills, Calif.



# THE FLYING SAUCER CAME LATER! And this one really flies. The Navy takes the bows with an assist from Hiller Helicopters, who built the machine. But the real beginnings of the Air Age was touched off by the French Montgolfier brothers back in 1783. The balloon was made of paper,

the fuel hot air. The first passengers a sheep, a duck and a rooster.

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### Three-Cent Air Mail May Speed Growth of Airlines' Postal Revenue

By ERIC BRAMLEY

What's happened to domestic air

It's almost stopped growing. Particularly over the past three years, the growth trend has flattened out.

Principal item now propping up volume is experimental first-class mail by air. Including this 3¢ mail, domestic airline mail ton-miles last year (not including local service lines) should gain between 9% and 10%. Exclude it, however, and the growth will be less than

• In the first nine months of 1955, better than one out of every six tonmiles was 3¢ mail.

Lack of continuing substantial year-to-year growth leads to fear in the industry that the Administration's proposal to boost air mail postage to 7¢ and first-class to 4¢ would have a serious effect on air mail. Chances of Congress voting the increase-particularly in an election year-are slim, how-

What's the answer, if ton-mile gains continue to lag? This may be the time to push for all-up mail," says an industry researcher who has been watching the trend.

There's also the possibility that the Post Office may extend the 3¢ mail experiment to more routes, boosting volume. Until last month, the Post Office was stymied. A lower court, acting on a railroad petition, had ruled that P.O. could move 3¢ mail by air on an experimental basis but not on a permanent basis. Now, however, Count of Appeals has reversed the ruling.

• Three factors have stimulated air mail traffic since the end of World War II: (1) introduction of air parcel post; (2) Korean war; (3) first-class mail by air. Had it not been for these factors. probability is that the ton-mile graph would have started flattening out several years ago.

Some observers trace postwar trends as follows: between 1946 and 1947, there was a slight ton-mile loss. In 1948, increase was a healthy 14%, partly caused by introduction of air parcel post on Sept. 1, 1948 (parcel post ton-miles are

included with letters).

Gains of 9% and 13.3% were shown in 1949 and 1950, followed by a whopping 35.8% jump in 1951. Reason: the Korean war (on soldier mail destined overseas, domestic lines receive credit for ton-miles on U.S. portion of the haul).

• With war continuing in 1952 and the number of U.S. troops based overseas much greater than in pre-Korean period, mail traffic was up another 8.5%. War's end in mid-1953 was followed (in October) by start of first-class mail experiment New York-Chicago and Washington-Chicago. The year showed a 5% increase including first-class experiment, only 2.4% with

In 1954, full impact of the experiment (extended in February to New York-Florida and Chicago-Florida, and later to north-south route on the west coast) was felt. Including experimental tonnage, year's total was up 11.8% However, excluding this tonnage from both 1953 and 1954 totals, the 1954 result was a 3% decrease.

In 1955, if trend of first nine months holds, increase will be 92% including 3¢ mail, only 3.8% without.

It's impossible to plot how rapidly the ton-mile curve might have flattened without parcel post and the Koren war. Parcel post ton-miles aren't separated in carriers' statistical reports they're lumped with air letter mail. Some indication of its effect may be seen from P.O. figures showing that of total originating domestic air mail poundage (not ton-miles) in fiscal 1954 42% was air parcel post. Likewist soldier mail is not separated.

The 3¢ mail, however, can be separated. Excluding it, and looking back six years, air mail's growth looks like this:

From 1949 through 1952, a 67% increase.

From 1952 through 1955 (estimated), only a 7.1% rise.

Factors mentioned that may no be contributing to stunted growth:

• Diversion. More large mail user

### Continental Orders 707s and Viscounts





Continental Air Lines' \$50-million new equipment program (AMERICAN AVIATION, December 19, 1955) will include a fleet of four Boeing 707 jets (top), 12 Vickers Viscounts (bottom) and five Douglas DC-78s.

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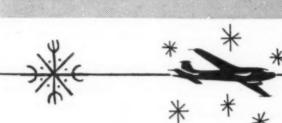
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have discovered that letters which they used to send via air mail now fly for  $3\phi$  on experimental routes.

 Teletype. Big corporations have increased use of leased wires and highspeed teletype to expedite correspondence between offices.

 Corporate aircraft. A few instances have been reported of corporate planes carrying correspondence between plants.

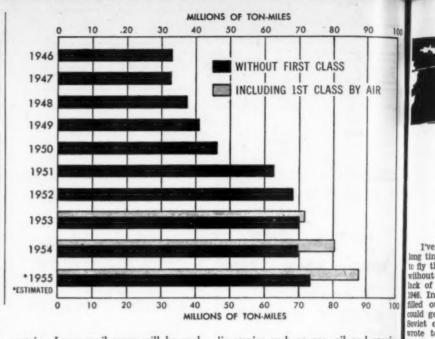
• Air freight. Some speculation that intensified air freight selling campaign by airlines may have diverted traffic from parcel post. Cargo experts discount this, however—airlines' return on parcel post is higher than on freight. Also, because of minimum charge, most small packages will go parcel post. Airlines, through Air Traffic Conference, are spending thousands of dollars advertising parcel post service.

What would be the impact of allup mail—a 5¢ rate for all non-local letters, with air transport used for everything traveling more than 400 miles? Do airlines have capacity to handle it?

Interest in this proposal has been rekindled as air mail trend has become evident. Based on the last study made, well over a year ago, all-up plan would mean increase for airlines of over 116 million mail ton-miles yearly (1955's estimated total for air mail plus 3¢ experiment: 87.6 million). Air Transport Association says industry has plenty of capacity to handle it.

ATA further estimated that all-up policy would cut Post Office deficit by \$306 million. P.O. revenue would jump \$346 million; balancing cost increase would approximate \$30 million, plus \$10 million for contingencies.

Election year action on this plan is doubtful too. Railroad opposition is



certain. Large mail users will be cool. This year may see more talk from industry on the plan, but push for action, if it comes, is unlikely before 1957.

Curtiss-Wright Sues Link on Patents

Curtiss-Wright Corp. has filed a patent infringement suit against Link Aviation, Inc. in the U. S. District Court for the Northern District of New York at Binghamton, charging that Link is manufacturing and selling flight simulators and other flight training equipmen in violation of patents held by Curtiss-Wright.

Curtiss-Wright is asking for a court order restraining Link from continuing to make and sell the simulators and training equipment. C-W also seeks an accounting and "just damages."

The suit is believed to be the result of Link's design and production of the E-600 flight translator, scheduled to be delivered soon, for Flight Safety, Inc., La Guardia Airport, New York.

### Texas Service Firm Seeks Non-Carrier Channel

Associated Radio Service Co. of Dallas has applied to the FCC for a transmitter and receiver on the channel of 123.0 megacycles to allow non-carrier aircraft to contact ground services directly at an airport.

In a letter to FCC, Carl H. Fox, company president, suggested that "this channel be made available to any bona-fide company that is performing a pub-

lic service such as gas, oil and repairs. That company would maintain their equipment and provide this service at no charge."

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"The airlines," he said, "have channels and ground facilities to carry out their requirements, which is as it should be. As you know, business aircraft ounumber airlines many times and they transport key personnel to all points. They have to rely on fixed base operators for their ground services. This channel is badly needed to fully satisfy their requirements."

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AMERICAN AVIATION



### EN ROUTE. WAYNE W. PARRISH

### Story Of A Man Who Always Wanted to go to Russia

(Part 1)

I've wanted to go to Russia for a g time. During World War II I tried to fly there via Alaska with ferry pilots without success. I tried with an equal lack of success via Berlin in 1945 and 1946. In 1947 I applied for a visa and filled out all the forms but I never could get so much as a "no" from the Soviet embassy in Washington. I even wrote to and cabled the top man in the Russian airline, Aeroflot, but never got an answer.

I was beginning to think they didn't want me

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I decided I'd make one more effort. Last June I asked the U.S.S.R. em-bassy in Washington for some more application forms. On June 21 I filed them along with the necessary photos and 25¢ and said I wanted to visit

Russia as a tourist.

About 3 p.m. on October 26 some about 3 p.m. on October 26 some four months later I was at my desk when the phone rang. It could have been just any sort of call. But a gent with an accent said, "Mr. Parrish, you'd better start packing."

I said "Is this Mr. Zinchuk?"—

I recognized the veice of the

ninking I recognized the voice of the

Press attache of the embassy.

"Yes, it's come through," he said

triumphantly.

From then on I was in the clouds. A visa to visit the U.S.S.R.! My friends had said I would never get it. But it had come through. And nothing would stop me. I was going, and going soon, even though winter was approaching. The impossible had happened.

Then came the planning. Fortu-nately, Bill Taylor, the SAS manager for Washington, had just returned from a Soviet tour with some Congressmen. Through Bill I found that SAS could arrange my whole itinerary with In-lourist, the all-powerful government agency which handles all tourists, through its agency in Finland, thus avoiding the red tape of dealing with the only two agencies in the U.S. auorized to arrange tours to the U.S.S.R. found that I could travel alone and ot have to join a group.

The Soviet embassy, quite cooperative from first to last, informed me I could enter and leave the U.S.S.R. at Parious points, i.e., I could enter via Belainki and esture through one or Helsinki Helsinki and return through one or more satellites. This was music to my tars. I had never been to Rumania, Hungary and Poland. Finally I had my Soviet visa safely stamped in my passport Also visas for Hungary and Czech-®lovakia. The Rumanian and Polish visas hadn't come through when I was scheduled to leave Washington. So I left without them, expecting to pick them up in Moscow

It was early afternoon on Novem-18 when I took American to New York. A cold front had come through along with a cloudless sky. My wife and I had lunch at the airport. It would be quite impossible to describe my inner feelings as I prepared to leave—alone—on this early winter trip to the other side of the Iron Curtain.

#### Blue "Underwear"

In my two-suiter Koch bag I had one suit and a pair of slacks. I had a blue wool ski suit to serve as underwear. I took only one pair of shoes, those I was wearing. The suit I was wearing was ten years old. I had a kit of anti-acid stuff, cold tablets, some toilet paper, an old towel, four cartons of Philip Morris cigarets, a carton of Fairchild matches plus TWA and PAA lighters, an assortment of old ties, three bottles of Scotch, two SAS overnight bags, a warm sweater, an old hat, an Official Airline Guide, and I wore a reversible topcoat.

At the last minute I added a dozen cigars. Every Christmas I get a box of fine Havana cigars from Juan Trippe, president of Pan American, I don't smoke cigars but during the year I pass them out sparingly. With another Christmas approaching, I decided to pass out the remainder of brother Trippe's cigars behind the Iron Curtain, with my compliments. In ensuing ar ticles I will tell you about this goodwill endeavor and the magic which it



At Idlewild Nov. 18. . . . Moscow bound.

So here I was on an American Convair flying to New York to take my third trip to Europe this year. We didn't fly very high and visibility was unusually good. I noted the new superhighways in the Baltimore-Wilmington-Philadelphia area, the boat traffic, the cars and trucks on the highways, the extensive suburban areas and the many factories. Here was the heartland of America and it looked good. It was prosperous. The homes and gardens looked neat. What sort of thing would I find in Russia?

#### Quick Farewell Martini

At LaGuardia, SAS's driver, Clar-ence, met me and we picked up Tore Nilert of SAS on the way to Idlewild. I checked in and we had a martini at the airport bar and then I was on board a DC-6B and off to Prestwick. A good dinner and a good sleep in a berth and here I was in Scotland at my favorite airport having coffee with George Simpson, who runs the airport hotel, and Murdoch, the head waiter, and Walter Gustafson of SAS and I was telling them about my forthcoming trip behind the Iron Curtain.

The next several days went fast. It was now Saturday and I flew to Oslo for a 24-hour stop with Per Backe, former SAS executive v.p. It was almost dark when we arrived because the days are mighty short up in the northland in winter. The sun had set at 3:20 p.m. There was snow, and the evergreens looked lovelier. The wooden houses and barns painted red against the snow were attractive. And I always liked the unusual arrangement of curtains in Norwegian homes. It was cold and winter. Oslo is in the same latitude as Anchorage, Alaska.

I stayed in the Grand Hotel, a fine old hostelry, and had dinner at an old restaurant. On Sunday Backe drove me all over the area and it was a sight to behold. Everybody in Oslo was out hiking or skating. Not a cloud in the sky. The gals and even the boys were wearing sweaters with unusually attractive designs. The kids wore stocking caps. I had never been in Norway before in the winter. Then came a fine dinner of reindeer meat and a dash to the airport and off I went on this Sunday evening to Stockholm in an SAS Scandia to be met by Knut Hagerup-Svendsen, the able SAS operations chief.

Whisked through customs, we went direct to the Grand Hotel, where I had stayed only a few months earlier. But what a contrast! The famous summer terrace was gone, leaving the hotel front quite naked. But the Royal Winter Garden with its 5-story-high interior and good orchestra, was open (too bad the summer tourists miss this) and we

had a late snack in the midst of plush and relaxed surroundings.

Next morning it was raining and snowing intermittently. I had lunch with Per Norlin, former SAS president, at Riche's, a fine spot to eat, and bought a pair of overshoes at the N.K. department store for my Russian expedition. (In Oslo I borrowed an Arctic fur hat from Backe). I had plenty of time to wander around the shops of Stockholm and bought a couple of books and a supply of chocolate bars. Then for a long dinner and evening with Norlin and Hagerup-Svendsen talking about aviation and Norlin's experiences in Russia. Rain had turned to snow during the evening.

With each hour my entrance into the U.S.S.R. was getting closer. Next morning—November 22—I left for Helsinki on an SAS DC-6B. I had just one day left in the west. At the airport was Kai Villa, of SAS, and General Leon Grandell, president of Finnair. There was lots of snow on the ground and more coming down. I was going deeper into winter. Christmas decorations were everywhere and it was colder. The day was dark. I wondered if my reversible were going to be warm enough.

Villa took me to lunch at a new grill in the Palace Hotel. A wonderful place to eat I ordered Kana Alexandra, chicken creamed with vegetables, out of this world. Every so often when I remembered that I was leaving for Russia I had a quick tug inside; it's pretty difficult to describe the sensation. I visited General Grandell in his offices and he told me about his visit to Moscow and the air agreement permitting Finnair to be the first western airline to fly inside the Soviet Union.

#### 'Wonderful But Rugged'

Then came a long dinner in the Palace restaurant with Grandell and C. J. Ehrnrooth, a prominent pulp manufacturer (and friend of M. M. "Jack" Frost of Eastern Air Lines), and Bertil Aulin, the savvy technical director for Finnair. If you've ever been entertained by the Finns, and this was my third such dinner in Helsinki, you'll know what I mean when I say it was wonderful—but rugged. I lost count of the different kinds of drinks we had but the conversation and hospitality was beyond compare. I like the Finns.

It kept snowing. By the time the dinner was over the sidewalks and streets were well filled. Next morning—still snowing—Villa took me to Arabia, the largest china and porcelain manufacturing plant in Europe, which also is a haven for top-flight modern artists in ceramics. I met one of my favorites, a quiet, slim little woman by the name of Rut Bryk, and gave her a commission for several more of her wonderful ceramic plaques. Her work is being exhibited in the U.S. this year. I also purchased a few items from the small collection available, as I think the Finnish artists are at the top of the world in new art creations.

The hours were ticking by. It was now noon and I was due to leave for Leningrad at 3:15. Bertil Aulin picked me up at my hotel. I checked out even though the volume of snow made me wonder if the Russian airline, Aeroflot, would be coming in. We had lunch at the airport restaurant—a huge hamburger cooked with red beets and it



II-12, standard Russian airliner.

was delicious—and I went through Finnair's big new hangar and workshops. Aulin got word that Aeroflot was coming through so we walked back to the terminal in deep snow. The evergreens were astonishingly beautiful.

Aeroflot's Ilyushin 12, a 21-passenger twin-engined transport with tricycle landing gear, landed in the snow as we neared the terminal. So I was going to leave for the east, after all. I checked in and saw the II-12 parked just behind an SAS DC-6B. The contrast in size and appearance was marked. The DC-6B loomed larger than ever and was bright and shiny. The II-12 with blue trimmings was not shiny and a little dirty. On the field the snow plows were busy and ramp agents had to keep pathways cleared to the two planes.

I proceeded to the transit quarters. About eight Russians, easily identified because of their caps and clothing, had gotten off Aeroflot and were connecting with SAS to go west. A couple of diplomats were also transferring. And about 30 or more other passengers were leaving Finland for Stockholm and other western points. I wondered how many were going with me to Leningrad. I smoked a lot and paced up and down and bought a soft drink. The minutes seemed like hours.

#### Lonesome Feeling

Finally the announcement came for SAS. All but six of us departed from the transit hall. I looked around at the other five. Only two were obviously Russians, the others could be diplomats or business men; obviously they weren't tourists. Never in my life have I had such inner emotions as those other passengers left on the DC-6B for Stockholm and I was about to head east into the unknown in the midst of a snowstorm. I can't say I was tempted to change my mind because I had been determined to go to Russia come what may. But I felt awfully lonesome, and should I say, on edge.

Then came the Aeroflot announcement in Russian, Finnish and English. I gathered up my overnight bags, took a deep breath, gave up my card at the gate, and walked out into the snow to board the II-12. Aulin, bless his soul forever, accompanied me to the steps. I entered the II-12, took a rear single

seat, kept my coat and hat on, fastened my seat belt (yes, there was one!), the other five passengers boarded and took seats, the engines were started, and we taxied out through the snow to the end of the runway. There was a warmup, and we took off to the north as darkness was descending fast. We were soon in the clouds and at about 3,000 feet altitude the plane made a sharp turn to the east and I was on my way in a Russian airplane in the darkness and soup to Leningrad on the other side of the Curtain.

(Next issue: Part II—Leningrad)

### CAB NEWS

### **Pending Cases**

The Eastern-Colonial Merger Cashas been transmitted by CAB to the White House for Presidential action. Four Board Members are reported to the favor of approving the deal. A previous merger agreement between the lines was disapproved by President Elsenhower when EAL was found thave gained illegal prior control of Colonial. The new agreement is still subject to possible court action on a National Airlines' challenge that CAB excluded issues which should have been considered.

Also, still pending at the White House is the deferred portion of the Transpacific Renewal Case involving Pan American World Airways' bid with the Great Circle route. Last February other portions of the case were decided but the President withheld action of the PAA bid. No indication, however, when a verdict might come.

#### **CAB** Calendar

Jan. 4—Hearing resumed, Large In regular Carrier Investigation (Plus phase). Wash., D. C. Docket 5132 et i

Jan. 10—Hearing, Florida-Tes Service Case. Wash., D. C. Docket 511 et al.

Jan. 11—Hearing. Tucson (Art. Service Case. Tucson, Ariz. Docket 5%)
Jan. 11—Oral argument. Respectively. Transatlantic Final Mail Rate Cowash., D. C. Docket 1706 et al.



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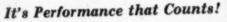




Ruth Law, the fifth woman to hold a pilot's license, learned to fly in 1912. She soon proved she could fly as well as most men; indeed, she competed with men in the aerial contests of the time.

With her many sensational exhibitions, Ruth Law earned the right to be called America's greatest woman stunt flyer. She was the first woman on record to perform the daring aerial loop-the-loop. In one of her exhibitions of night flying, she flew around the Statue of Liberty with the word LIBERTY spelled out in lights on the lower wing of her plane.

In 1916, Ruth Law flew non-stop from Chicago to Hornell, New York—a distance of 512 miles, to establish a new world's record. She accomplished this in a pusher plane, and her flight was a truly great achievement at that time. From Hornell, she continued on to Binghamton and New York City, for a total distance of 884 miles in less than nine hours.



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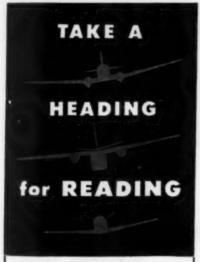
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